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An Address
ON
DISINFECTION AND DISINFESTATION IN THE FIELD.

Delivered at the Inaugural Meeting of the Navy, Army, and Air Forces Group of the Society of Medical Officers of Health

BY W. W. O. BEVERIDGE, C.B., D.S.O., K.H.P., M.B., M.CH., D.P.H.,
BRIGADIER-GENERAL, A.M.S.; DIRECTOR OF HYGIENE, WAR OFFICE.

MR. PRESIDENT AND GENTLEMEN,—I have chosen the subject of disinfection and disinfestation in the field for my address to you this evening mainly because I look upon it as one of the most important problems confronting us in future operations in the field, and one well worthy of our serious consideration. I have formed this opinion from experience in the late war. It is not too much to say that at least 50 per cent. of the total sick admissions among troops in the field can primarily be attributed to lack of personal cleanliness and to the presence of vermin. In the Second Army in France Colonel A. B. Soltau reported that the total sick wastage for the period March to October, 1917, amounted to 60,000, of which 20,000 were cases of skin disease, almost all due to vermin, dirt, or sepsis aggravated by dirt. It was also stated that 12,000 cases of trench fever occurred in addition. Any statements with regard to the incidence of trench fever up to June, 1918, when the disease became notifiable, must be accepted with some reserve. It was remarkable how quickly the incidence fell when notification was established. Colonel A. M. H. Gray, the consulting dermatologist, Army Zone, France, has stated that in his opinion at least three-quarters of all cases of skin diseases coming under his notice were due to vermin—whether lice or acari—the remainder being cases of sepsis due to slight abrasions, but aggravated by dirty skin and clothing.

Incidence of Lice and Resultant Wastage.

The prevalence of lice and the resultant temporary wastage depends largely on the conditions under which men have to exist in the field. Colonel Gray considers that under favourable conditions of bathing, change of clothing, &c., the incidence is under 10 cases per division per week. In rest billets behind the line during the war in France the incidence varied between 10 and 30 cases per division per week. When troops are in the line or on the move, however, the incidence in an average division may rise to 70 cases per week, or an annual temporary wastage of about 26 per cent. However good our arrangements for prevention can be made, it is unreasonable to anticipate that complete freedom from lice can be obtained in the field, owing principally to the fact that a very considerable proportion of civil populations harbours lice even in normal times. The introduction of lice into the army on mobilisation is very difficult to avoid. In spite of the fact that the Expeditionary Force in 1914 was completely free from vermin, lice very soon made their appearance, having been introduced by reservists on joining the colours. There is no doubt in my mind, however, that with properly organised arrangements an army in the field can be maintained comparatively free from dirt and vermin, and that a repetition of the great temporary wastage which occurred in the past may be avoided in the future.

Lack of Effective Chemical Means of Prevention.

I do not propose here to enumerate the general measures of prevention, which are rather outside the subject with which we are now concerned. Experiments and actual experience in the field has shown that up to the present no chemical preparation can easily be applied to the whole body or clothes which will effectually rid men of vermin. I consider that any attempt in this direction in the field is worse than useless, and tends to give a false sense of security. Much valuable time is wasted which otherwise could be devoted to measures which we know and can demonstrate to be effectual.

The whole question of chemical deterrents and insecticides was fully discussed at various meetings of the Allied Sanitary Conference in Paris, and although at first they were specially advocated by the Italian, French, and other delegates, eventually the consensus of opinion inclined to prevention in the form of regular bathing, change of clothing, and disinfestation of effects to the exclusion of all other methods.

A New Scheme under Consideration: Definition of Terms.

I may mention, however, that a scheme of organisation for future needs of an army in the field is being considered somewhat on the following lines:—

1. A cleansing unit: (*a*) Movable laundries to work in advance of railheads; (*b*) mobile baths and disinfestors, so organised that they can accompany a brigade group and work in a brigade area or be assembled in one place on a divisional basis. 2. A special department to be formed for the purpose of supervising and coördinating arrangements for disinfestation, bathing, &c.

For military purposes we have now, I think, to consider under what was formerly termed disinfection two distinct processes: (*a*) Disinfection proper, in which we aim at destroying pathogenic bacteria, including any spores which may be present; and (*b*) disinfestation, which implies the destruction of body vermin only.

From a practical point of view the term "disinfestation" or "to disinfest" was employed during the war to differentiate the two processes, for although methods of mechanical disinfection can generally be relied upon to kill vermin as well as bacteria at one and the same time, those of disinfestation are simpler. Disinfestation can be undertaken with far less costly and complicated apparatus than can disinfection, and the required apparatus is more readily supplied and more easily and economically worked—matters of great practical importance in the field. When heat is employed a lower temperature also suffices. Hot air at 60° C. will destroy lice and their ova in 10 minutes, but could not be relied upon effectually to disinfect blankets or mattresses, for instance, and certainly would not destroy spores in the case of anthrax, tetanus, or gangrene. On the other hand, chemical disinfectants which are effective in the case of bacteria would, in the strength used, very frequently not kill vermin, or in every case their ova. The French, for similar reasons, coined the word "disinsector," which, though not correct, is equally convenient and, perhaps, even more descriptive. The word "delouser" is crude and, from an æsthetic point of view, objectionable. The use of sundry large and prominent notices posted up in camps and by the wayside in France, such as "This way to the delouser" and "Corps delousing station," appeared to indicate to all beholders that the British Army was in a particularly verminous condition—which was not necessarily the case.

In 1917 the Director of Works, after consultation with me, issued a circular clearly defining for practical purposes the processes of disinfection and disinfestation, and laid down the types of apparatus and allotment to camps and other units on the lines of communication. This was a movement in the right direction, as the arrangements agreed upon established uniformity between, and fulfilled the requirements of, the Royal Engineers and the Medical Service.

I. DISINFECTION.

The principles of disinfection in the field differ in no way from those required in ordinary everyday life, but their application presents some variety and is often attended with considerable difficulty. The recognised forms of apparatus are frequently unsuitable for the front line or for troops in movement, or they cannot be supplied in sufficient numbers, and extemporary apparatus, or "appareil à fortune," as the French term it, has therefore to be brought into operation to suit varying needs. Owing to their weight and lack of mobility many of the best forms of steam disinfectors cannot be used, and a relatively large fuel consumption has also to be considered. To meet the former difficulty both the Allies and we ourselves devised special forms of portable steam disinfectors that were able to follow the movement of troops or could be used over large areas when troops were resting.

Mobile Steam Disinfectors.

In our army, Thresh current steam disinfectors mounted on Foden wagons were supplied to every division and also to corps headquarters. With the growth of the army and the increased movement of the troops in 1918 it was found that this allotment was insufficient, and more disinfectors were therefore asked for on a basis of two per division. Sir William Horrocks has designed a very efficient portable form of steam disinfector or disinfestor in the form of two chambers on a trailer. Steam is supplied from a Merryweather boiler and drying is arranged for by means of heated coils. The apparatus can be worked either with steam or hot air, and its disinfesting capacity is considerably greater than that of the Foden-Thresh. This type will, we hope, form part of the equipment of an army in the field in the future.

Experience quickly showed that horse-drawn vehicles were unsuitable for field requirements; movement was far too slow and sometimes there was a difficulty in procuring the necessary horses. The ordinary portable form of two-wheeled disinfector, though excellent as regards working requirements, failed from a mobile point of view, and it was quite a common occurrence to see one lying by the roadside minus a wheel or with broken shafts or chimney. For use in the field disinfectors must undoubtedly be mechanically propelled. The Italians and French used mobile steam disinfectors which differed from ours only in matters of structural arrangement.

Various forms of steam disinfectors were improvised, especially by sanitary sections, which showed special aptitude for constructing in the field at short notice any form of sanitary apparatus, and the results obtained were really marvellous. Such forms comprised the modification of the well-known Serbian barrel—first used during the epidemic of typhus in Serbia in 1915—steam chambers, oil-drum steam disinfectors, and the like, too numerous to describe. I may here allude to a very good form of steam disinfestor, the Lelean sack disinfestor, and also to Major J. Dale's steam box disinfector, both of which are based on the same principle.

The method of adapting railway wagons for disinfecting purposes, the necessary steam being supplied from an engine, is a good one, but not new. I saw some excellent extemporisation in this way carried out by the Belgians early in 1915. This method was also successfully followed in Egypt and Mesopotamia. The method, however, was quite impracticable in a large area and with such large forces as were operating in France, and it would have been quite impossible to acquire either the engines or wagons, as these were far too valuable and urgently required for their legitimate purpose.

As carried out in the armies in France, disinfection was largely concerned with the clothes and effects of cases of infectious disease either in the field, in advanced hospitals, or in infectious and other hospitals on the lines of communication. I am bound to say there was no lack of energy displayed in this direction; indeed, the energy was often in excess of requirements. The disinfection of excreta, either by burning or by means of chemicals, was resorted to from the beginning of the war. Disinfection was required in the case of wells in villages taken from the enemy, which were often purposely grossly polluted, and also in billets, laundries, trains, troopships, and barges.

The steam disinfectors also served another useful purpose in the treatment of clothing and other effects which had been in contact with mustard gas. Moist heat at a temperature of 80° C. was considered to be effective. It will interest you to know that all blankets, bedding, bed-linen, and clothing have been disinfected before being transported home from the war areas, and therefore any risk there might have been of spreading disease by this means was reduced to a minimum.

When the Expeditionary Force took the field in 1914 each hospital on the lines of communication was supplied with portable Thresh disinfectors (steam). Doubt was at one time thrown on their power of effectually destroying lice and their ova, but from experiments carried out for me by several competent bacteriologists it was demonstrated that both lice and their ova were destroyed in blankets and clothing when exposed for at least 45 minutes to the action of steam.

When one recalls the number of wounded continually arriving at the hospitals, and the fact that immediately upon being discarded every article of clothing and as much of the equipment as was necessary was put through the disinfector, in addition to all hospital linen and blankets, it is not to be wondered at that very soon, and with the increasing size of general and stationary hospitals on the lines of communication, the necessity for greater facilities for disinfection became urgent.

Stationary Steam Disinfectors.

The need for disinfection by means of reliable apparatus which would ensure the destruction of spores, really needs no comment. The men's clothes were covered in mud, often blood-stained, nearly always verminous and likely to contain, from contact with the heavily manured soil of France, spores of tetanus, gas gangrene, and even anthrax. We therefore decided to provide all hospitals with high-pressure steam disinfectors, and it is gratifying to think that every hospital from an early period of the war was supplied with the best up-to-date form of disinfecting apparatus. General hospitals were then furnished with either one L.O. or two M.O. Alliott & Paton high-pressure stoves. (In general the two M.O.'s were more popular, as only one of the two M.O.'s needed to be worked, which meant a saving of labour and fuel.) Stationary and infectious hospitals were also supplied with high-pressure steam disinfectors.

Large central disinfecting stations, comprising baths and high-pressure steam plants, were established at all the bases on the lines of communication and at the advanced base. In addition to routine local work, blankets and clothing of men passing through were also dealt with, and many of the camps sent in their clothing and blankets at regular intervals.

All convalescent camps were supplied with disinfectors; as a rule, three Thresh machines were allotted to each camp and proved sufficient. To meet the increasing demands in the later stages of the war, when constructional work and means of transport had become difficult, we had to resort to certain forms of improvised steam disinfection. These consisted chiefly of steam chambers made either of wood, asbestos lined, or of cement, into which steam was admitted at the top and into coils of piping in the roof and walls. For drying purposes the steam, after being extracted from the chamber by a fan, was allowed to remain in the coils. The clothes were hung on trolleys which travelled on rails into and out of the chambers. This method of hanging clothes is of the greatest value, and far in advance of the usual plan of packing them into a cradle; I attach great importance to it, whether steam or dry heat is used. The whole surface of the garments can be fully exposed, the necessity for rapid penetration is done away with, and the creasing and shrinkage of the clothes which take place when steam is employed are to some extent prevented. This method also prevents the overloading of the chambers, which often occurred through anxiety to carry out the work with the least possible delay, and had constantly to be watched and checked, as otherwise disinfection or disinfestation naturally failed. The latter is an instance of the unfailing care and attention to detail which had to be exercised in order that efficiency might be maintained in all matters connected with hygiene and sanitation.

I may here mention that all clothes sent for washing and repair to the area laundries—laundries so extensive that their output amounted to 5000 pieces an hour—were passed through steam chamber disinfectors before being dealt with. The clothes were sent down from the line in special impervious canvas sacks fitted with tightly closing mouths, so that escape of vermin in transit was rendered impossible.

In addition to steam, disinfection by means of sulphur dioxide was also employed. One Clayton apparatus was supplied to each corps headquarters, and several were in use at the base ports on the lines of communication, notably at Marseilles, where infectious disease was constantly imported by means of transports coming from the East.

In order to ensure success it is necessary that the working of the plant is entrusted to well-trained attendants, and that the greatest care and attention is observed—matters of difficulty in the field. We issued a small pamphlet describing the working in detail, both for the machine and the motor engine, and appointed a skilled inspector to visit the installation periodically. At the base ports the method worked well and was appreciated. Incoming infected transports at ports such as Marseilles, Brest, and Cherbourg were disinfected by means of Clayton sulphur dioxide disinfectors, which were brought alongside in special barges by the port sanitary authority.

German System of Disinfection.

The system of disinfection adopted in the German army was similar in many respects to our own, and hot-air disinfectors were largely used by them on the Western Front. In order to prevent the introduction of infectious disease into Germany from army fronts, the Supreme Command issued very stringent regulations by virtue of which all officers and men before entraining were required to proceed to a disinfection centre, where they were inspected, bathed, and had all clothes and baggage submitted to disinfection. The time allowed for disinfection from the time of arrival of a train until departure of a "clean" train was limited to eight hours; all intercourse between the disinfected and those not disinfected was prohibited, and men were kept under medical observation for the remainder of the journey.

Chemical Disinfectants Used in France.

With regard to the use of chemical disinfectants, it is noteworthy to observe how few are really necessary in war-time, given that their efficiency has been proved beyond doubt. It is well that this is so, for chemicals at all times are difficult to transport, requiring special packing, and many are also costly. In France disinfectants were sent up the line from base ports daily with the divisional pack—i.e., the train carrying the daily rations—and found their way with the food to the divisional areas and to the trenches themselves. It may be noted that we relied upon three disinfectants—cresol, formaldehyde, and chloride of lime or bleach.

Cresol is probably the most valuable disinfectant that we have at the present time for general use in the field; it has many advantages in addition to the ordinary use as a disinfectant. In hot solution it could be relied upon to kill lice and their ova. It proved a valuable deodorant and was also efficacious under certain conditions for the destruction of flies and their larvæ. I would like also to call your attention to Major Mayne's method of using cresol as a larvicide. He found that an emulsion of 1 in 100,000 was effective and imparted no objectionable taste to the water. Cresol has also been recommended for bilharzia-infected waters. I have even seen it used for staining floors and bedside tables with excellent effect. Cresol for use in the field was contained in drums, which drums served many useful purposes and were eagerly sought by sanitary sections. I really do not know how we should have managed had it not been for the oil drums, kerosene tins, and biscuit and tea boxes which found their way to the sanitary section workshops and reappeared as sanitary appliances far too numerous to describe at present. I think a very instructive and useful thesis could be written on the use and advantages of the oil drum and kerosene tin.

The use of formaldehyde was chiefly confined to the spraying of infected premises, and for the destruction of flies either by spraying or in solution in saucers placed in all kitchens and dining halls. I know no more useful deodorant than formaldehyde in the case of decaying animal matter. At one period of the war great discomfort and even injury to health were caused among the men engaged in sorting and checking pay-books sent down from the battle-fields; these books were often soaked in blood and other discharges, and consequently were very objectionable to deal with. My advice was sought, and in addition to improvement of the ventilation of the rooms in which the men worked and other general measures I had the pay-books submitted to the action of formaldehyde, generated in a simply-made chamber by means of potassium permanganate and formalin, with the result that all objectionable smell was completely removed and the men worked in comfort. This effect is due to the action of formaldehyde on protein matter and is one well worth remembering. The only disadvantages of formaldehyde are its irritating effects and its relatively high cost.

The third disinfectant, chloride of lime, was invaluable, and I should be afraid to say how much of it was used during the period of the war in France alone, but fortunately it is cheap and easily obtainable. It is necessary, however, that it be well protected from light, heat, and moisture, or it quickly fails in its effect through loss of the available chlorine on which its disinfecting properties depend. As you are well aware, from the commencement of the war all water-supplies were disinfected by means of bleach or chlorine gas, and it was necessary that only the purest bleach should be used for this purpose. Two grades were supplied—one for general disinfecting purposes, not necessarily of the purest, and the other put up in small tins for water purification, containing, according to specification, not less than 30 per cent. of available chlorine. We have recently arranged that bleach for the sterilisation of water will be packed in 4-ounce earthenware jars, containing a measure and fitted with a special air-tight cover. This bleach was constantly examined at the mobile and base hygiene laboratories, and it is gratifying to state that, on the whole, the amount of available chlorine came well within the specification. Bleach is unsuitable for use in hot climates, and in Mesopotamia had to be replaced by another halogen. The custom of sprinkling chloride of lime on the ground in unsavoury places dies hard, but we managed to kill it in France. If there is necessity to use a deodorant for such a purpose, then it is evident that sanitation has failed, and little is gained by hiding one smell by another. Chloride of lime was also invaluable for disinfecting and removing from effluents from ablution benches and laundries the soap which would otherwise have choked the soakage pits into which they were discharged.

II. DISINFESTATION.

Early in the war efforts were made to provide divisional baths, where the men on return from the trenches could take hot baths, be supplied with clean underclothing and at the same time have all their clothing disinfested. One of the first of these baths was installed at Nieppe by Colonel D. M. O'Callaghan in some dye-works, the vats being used as baths. Ultimately the Germans got wind of them, and they were destroyed by shell-fire, the men engaged in bathing at the time escaping without their clothes. Other divisions quickly provided themselves with baths, situated either in factories or similar buildings, or special accommodation erected by the Royal Engineers.

Disinfestation of clothing was carried out either by steam, or by pressing the seams of the outer clothing with hot irons. It was quickly recognised that steam disinfestation had many disadvantages, and attempts were made to replace steam by hot air. The disadvantages of steam are that unless it is available as in laundries special boilers are required, and the necessary fuel is at times not forthcoming. Secondly, clothes—especially outer clothing—are liable to shrink and crease when compressed in the chambers. Drying in special machines takes time, and in extemporised apparatus, more especially in wet weather, immediate thorough drying is almost an impossibility.

Hot-Air Disinfestors.

The high standard of efficiency which is necessary in the case of regular steam disinfectors to destroy bacteria and their spores is not required to destroy vermin, and therefore the simpler and less costly hot-air disinfestors, working at a lower temperature, are more suitable for the destruction of vermin in the field. From the point of view of louse destruction alone, it was apparent that if the difficulties attending the circulation of hot air in the chambers could be overcome, so that all parts of the clothing would be exposed to an equal temperature, then hot-air disinfestation would prove the better method, for the following reasons:—

1. The necessary lethal temperature is easily obtained by means of any available fuel, such as coke or wood. In France we relied upon a temperature of from 75–80° C., maintained for 20 minutes with perfect success by means of burning coke.
2. No shrinkage or creasing of the clothing occurs. Clothes are not spoilt in any way as long as the temperature does not exceed 110° C., and buttons and badges are not tarnished.
3. No drying of the clothing is required, and men are issued with dry, warm clothing, which is a real comfort in the field.
4. Perfect efficiency. No risk whatsoever of lice and their ova not being destroyed in well-constructed plants.
5. The process is much more rapid than that of steam, as no after-drying is necessary.
6. Any article of clothing can be dealt with, including riding-breeches, leather, gum-boots, and other articles of clothing and equipment which are liable to be injuriously affected by steam.
7. The cost of construction and expense of working is considerably less than when steam is employed.
8. Most of the types can readily be made from material available, such as corrugated iron, rails, &c.

Major Orr's Disinfestor.

To Major H. Orr, of the Canadian Army Medical Service, belongs the credit of having designed a plant which fulfilled all these requirements, and in which sufficient means were arranged for circulating the air, and so conveying a uniform temperature throughout the chamber. This type of apparatus was extensively used in the First Army area and also in various camps and bases with excellent results. Lice and their nits were baked as hard as biscuits within the space of 20 minutes. It was also the type used in connexion with bathing establishments for men on demobilisation. Major Orr's hot-air disinfestor can briefly be described as follows:—

The disinfesting chamber, which measures 15 feet long, 8 feet wide, and 6 feet high inside, is constructed over a pit, with sloping sides measuring 7 feet by 14 feet at the top and 5 feet by 10 feet at the bottom; a stairway at one side leads to the entrance of the pit, which is closed by a tightly-fitting metal door. Two specially constructed braziers, 24 inches in diameter, each capable of holding 120–125 lb. of coke, are placed in the pit. Air is supplied to the braziers, by two 4-inch pipes, which enter the chamber at each side of the door, and open directly beneath the braziers. The floor of the chamber over the pit consists of corrugated iron, perforated with 126 openings, each 3 inches by 6 inches. Three 4-inch, right angle, air outlet pipes extend through each of the side walls close to the ceiling. These outlet pipes, in conjunction with the air inlet pipes beneath the braziers, provide for the circulation of hot air and gases through the chambers. The front of the chamber consists of two double tightly-fitting doors made of wood insulated with asbestos or metal, or of metal alone. The clothing for disinfestation is hung on specially constructed trucks or trolleys, which can be moved into and out of the chamber on light railway lines. Each truck carries 128 articles of clothing or blankets. The fuel consumption amounts to about 200 lb. per day, and the braziers after starting require no further attention, except sometimes the addition of a little coke at noon.

Disinfestation is completed when the clothing has been exposed to a temperature of 75° C. for 20 minutes. It was found by experiment that the temperature beneath the folds of the garments was from 10–15° below that of the surrounding air of the chamber; it was therefore necessary to expose the articles for 20 minutes to a temperature above 75° C. (as indicated by a right-angle thermometer supplied and fixed to the chamber) to ensure certainty of disinfestation.

Russian Pit Disinfestor.

This very serviceable and efficient form of hot-air disinfestor, simple to construct and easy to work, was brought to my notice by General Sir William Macpherson. This form was extensively used in the Fourth Army and in many labour and prisoner of war camps.

It consists of a chamber 8 feet long, 6 feet wide, and 7 feet deep dug in the ground and roofed in with corrugated iron suitably supported. A layer of earth is spread over the roof. Access to the chamber is gained by an entrance 2 feet wide extending from the roof to the floor at the middle of the longer side of the chamber, closed by a corrugated iron door fitted in grooves. Two simple stoves made out of oil-drums, placed in each of the far corners of the chamber, supply the heat. These are stoked from above through the flues, which lead upwards through the roof to about 2 feet above the layer of earth. Clothes, after being turned inside out, are suspended on wires strung across the chamber. Disinfestation is completed in from 30–60 minutes, and a temperature of 90° C. can be obtained in the centre of the chamber. Air is best supplied by means of ducts carried from the well of the entrance, under the floor of the chamber, and opening directly beneath the stoves. About 200 blankets or 100 kits can be dealt with at one time. This type of disinfestor was, however, not suitable where the ground water approached the surface, as in the Ypres Salient.

CONCLUSION: SCHEME FOR GENERAL DEMOBILISATION.

In the interests of the population at home, as well as of the men themselves, it was imperative that the men should leave France clean and free from vermin. I was asked to draw up plans for cleansing establishments, to include bathing and disinfestation arrangements for 3000 men per diem at each port of embarkation, at least 18 months before the armistice. The plans were approved, but owing to the favourable opinion I had formed of the hot-air disinfestor designed by Major Orr the latter was substituted for the steam type of apparatus originally proposed. The uninterrupted success of the hot air system justified my action, and doubtless the problem of disinfestation in the field for all troops except those in the immediate front line can now be said to have been solved.

Owing to the large number of men to be dealt with in a limited time on general demobilisation, it was considered advisable that sanitary precautions as to cleansing and disinfestation of clothing should be carried out on a comprehensive scale at each centre of demobilisation immediately prior to embarkation. Centres for demobilisation were arranged in connexion with the various ports of embarkation. These camps received the numbers of men allotted to embark on any one day; they were divided into "a dirty section" and "a clean section," between which cleansing stations were interposed. The men on arrival proceeded to the dirty section, and after being bathed and then disinfested at the cleansing station moved into the clean section, where they remained until they embarked for England. Each complete cleansing installation was designed to provide for the bathing and disinfestation of the clothes of 3000 men in from 10 to 11 hours. These installations were provided on a basis for dealing with 50 per cent. more men than the camp accommodated, to allow for breakdowns and overlapping. The bathing arrangements included dressing rooms, hot sprays (24 per 3000 men per day), and drying rooms, with accessories, such as towel rooms, dirty underclothing and clean underclothing stores. Bathing and disinfestation could be carried out simultaneously through the day.

For disinfestation the hot-air disinfestor designed by Major Orr was adopted. This type of disinfestor was highly efficient and satisfactory in working owing to the continual passage of a current of hot air through the chambers. On account of the low specific heat of air a rapid circulation of hot air is necessary to raise the temperature of the clothing to the lethal temperature within a reasonable time. The articles to be disinfested for each man were: (1) tunic, (2) trousers, (3) shirt, (4) vest, (5) greatcoat. The men were supplied with clean underclothing, of which a stock of 12,000 pieces was kept at the cleansing station. The underclothes worn by the men on arrival at the baths, such as shirts, undervests, and pants, were dispatched to area laundries, where they were disinfested in steam chambers, washed, and returned to the cleansing station for re-issue.

The men brought down their blankets with them, and these were disinfested and re-issued to the camps. The blankets used in the dirty section of the camps were disinfested at least once a week, or oftener, if in the opinion of the medical officer it was considered necessary. In the clean section the blankets were also disinfested weekly. Facilities for disinfesting the blankets were afforded by working the hot-air disinfestors during the night hours. At any one installation 3000 blankets could be disinfested in three to four hours, allowing at least half an hour in the disinfesting chambers. Medical inspection was carried out as the men passed through the baths by a medical officer, and cases of scabies or other diseases were sent to a hospital specially allotted to receive men from camps of demobilisation. As the stay in camp was liable to be tedious, sports, games, and other recreations were organised.

THE RESULTS OF PNEUMOTHORAX TREATMENT OF PULMONARY TUBERCULOSIS.*

BY PROFESSOR CHR. SAUGMAN,
MEDICAL SUPERINTENDENT OF VEJLEFJORD SANATORIUM, DENMARK.

THOUGH pneumothorax treatment of pulmonary tuberculosis has for several years made itself respected, the statistics of the final results are yet only scarce. As Brauer has pointed out, it is, on the whole, very difficult to compile statistics of the patients thus treated because they belong to the most severe cases, and each of them has its own peculiarity. A detailed communication of the cases, one by one, gives much fuller information. But having now at Vejlefjord Sanatorium more than 12 years' experience and a material consisting of over 400 pneumothorax-treated patients, I think our numbers are sufficiently great for statistical analysis.

Since December, 1906, we have treated in our sanatorium 430 patients,[1] with about 10,000 punctures in all. As to the risk of the first injection of gas through a sharp needle (having only in a few cases employed Kuss's blunt trocar), I would remark that after the two cases of sudden death (Nos. 98 and 163, which occurred in 1910 and 1912, and which have already been reported[2]), i.e., in a series of 277 cases,[3] we have had no accident at the induction of the pneumothorax, so that the mortality of the first operation in our material has sunk below ½ per cent. The two cases mentioned above were probably due to gas embolism, though it could not be proved by the post-mortem examination. With our present cautious technique we have seen no dangerous complications from the injections of gas.

In order to judge the results of pneumothorax treatment I have investigated the after-histories of the patients discharged from 1907 to 1916, and whose records were known to the sanatorium in January, 1919. Certain inquiries also refer to patients belonging to 1917. During these 10 years 275 patients (about 57 per cent. women, about 60 per cent. left-sided), in whom collapse treatment had been tried, were discharged from the sanatorium. Six of these suffered from non-tuberculous diseases (bronchiectases, consequences of gangrene of the lung, tumours) and are excluded, together with the two cases of death at the first injection and, besides, eight patients who later on were treated by thoracoplasty during or after their stay in the sanatorium, and thus are of no importance in the judgment of the results of pneumothorax treatment. Consequently, 259 patients remain. They all belong to the third stage, except two cases in the second stage, in which we tried collapse treatment because they did not seem for a long time to improve under general sanatorium treatment. Strange to say, the attempts in both cases failed on account of total pleural adhesions. By continued sanatorium treatment they have gradually recovered, and their disease may now be regarded as arrested.[4]

The others—i.e., 257 patients—belonged to the third stage, and in all these cases tubercle bacilli were found in the sputum. In 172 cases we succeeded in forming a pneumothorax, though not always a large one; while our attempts in 85 cases (i.e., 32 per cent.) did not result in the formation of an efficient pneumothorax.

In the after-histories of these 85 patients we have a standard for comparison. The cases are quite similar to those in which the treatment was technically effective; the only difference is that the one series could be treated in this way and the other not. Consequently we can from the after-histories of these 85 patients in some measure conclude how the 172 others would have fared if pneumothorax treatment had not been employed and had not influenced their condition favourably or otherwise. Only this objection might be raised that cases with total adhesion of the pleuræ have a worse prognosis than others; this is, however, contradicted by the even excellent results that in such cases can be obtained by thoracoplasty, results that are by no means inferior to the results of pneumothorax treatment. In this group we also have a standard of the quality of the whole material. By a comparison with the final results of another series of third-stage, sputum-positive cases collected in 1911 these cases show that after 2–10¾ years 25 per cent. were able to work and 69 per cent. were dead, while our series of controls, collected in the same way, shows respectively 13 per cent. and 80 per cent. Consequently this material has been even considerably more serious than the average of the third-stage cases with bacilli.

The inquiries into the after-histories of these two series of patients in January, 1919, are indicated in Table IA., this table including all cases that have been treated. Yet this table does not give any real index of the importance of pneumothorax treatment because it includes a great many quite hopeless cases, which were treated partly *ut aliquid fiat*, partly *solaminis causa*. Of course, such cases are absolutely unimportant in the judgment of the value of a method. Therefore it is just to exclude all the hopeless patients—i.e., partly such whose better lung can hardly be expected to do the work of two, and partly such whose symptoms of intestinal tuberculosis have appeared either before or immediately after the beginning of the treatment. Further, there are the cases in which the treatment had at once a bad influence, and was therefore quickly abandoned. The material thus somewhat sifted gives a better idea of the importance of the treatment, although there is among the remaining cases a large series in which the indications for the treatment, on account of the state of the other lung, were rather—or even very—dubious. The results of the two series, after this exclusion, is seen from Table IB.

Patients Discharged 1907–16 Inclusive; Their Condition in January, 1919.

TABLE IA.—*The Complete Unsifted Material (257 patients).*

TABLE IB.—*The Same Table after Exclusion of the Quite Hopeless Cases (220 patients).*

—	(A) Treatment technically				(B) Treatment technically			
	Effective.		Ineffective.		Effective.		Ineffective.	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Able to do general or light work.	55	32	9	10·6	55	38·5	9	11·8
Unable to work on account of tuberculosis.	5	2·9	3	3·5	5	3·5	3	3·9
Dead from tuberculosis.	109	63·4	71	83·5	80	55·9	63	81·8
Ill or dead from other causes.	3	1·7	—	—	3	2·1	—	—
Unknown.	—	—	2	2·4	—	—	2	2·6
—	172	—	85	—	143	—	77	—

I may add that 16 of the 55 patients classed as able to work are still undergoing treatment, while 39 have ceased treatment. Bacilli had disappeared in 39 per cent. of the treated cases, only in 12 per cent. of the untreated.

We see that the number of those who in 1919—i.e., 2–11½ years after discharge—could be classed as able to do general or light work in the "effective" cases is more than three times as great as in the "ineffective" cases, while the mortality is only about two-thirds. My assistant, Johannes Gravesen, has recently demonstrated the following very interesting fact: in cases of *complete* pneumothorax without notable adhesions the percentage of capacity for work after 3–13 years was about 70; in cases of *incomplete* pneumothorax only about 11. Table II. gives an idea of the fate of these patients during some years, showing the state of all patients from 1–10 years after discharge of the complete and of the sifted material.

* A lecture delivered at the Ninth Scandinavian Medical Congress in Copenhagen on August 20th, 1919.

[1] To the beginning of August, 1920, 500 patients.

[2] Saugman: Zur Technik des künstlichen Pneumothorax, Brauer's Beiträge, vol. xxxi., 1914.

[3] To the beginning of August, 1920, 337 cases.

[4] One of them died in January, 1920, from influenza.

TABLE II.—(A) *The Complete, Unsifted Material (1907–17).* (B) *The Same Table with Exclusion of the Hopeless Cases.*

—	(A) Treatment technically																				(B) Treatment technically									
	Effective (per cent.).										Ineffective (per cent.).										Effective (per cent.).									
After years:	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
Can do general or light work.	35	36	33	30	26	24	27	18	17	20	17	17	19	17	15	16	13	16	0	0	42	45	41	37	31	30	32	23	26	30
Unable to work.*	25	17	12	9	6	4	4	4	0	0	22	22	17	12	8	4	3	5	0	0	25	18	13	10	6	5	5	5	0	0
Died of tuberculosis.	40	47	55	61	68	71	69	78	83	80	60	60	63	72	77	80	83	79	100	100	32	37	46	53	62	65	63	72	74	70
No. of cases ...	194	175	159	140	117	98	75	50	29	15	88	81	71	60	52	44	30	19	18	2	161	142	132	114	96	80	63	39	19	10

—	(B) Treatment technically																			
	Ineffective (per cent.).																			
After years:	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
Can do general or light work.	20	19	21	19	17	14	16	19	0	0										
Unable to work.*	23	25	18	13	11	8	4	6	0	0										
Died of tuberculosis.	56	56	60	68	72	78	80	75	100	100										
No. of cases ...	78	73	65	54	46	39	25	16	6	1										

* On account of tuberculosis.

From Table IIA. I have excluded the numbers after the seventh year as being too small, and therefore rather accidental, and have composed the curves here shown.

These tables and curves show that of the technically effective cases, after 3 years, more than 40 per cent., and, after seven years, 32 per cent. were still able to work; the parallel numbers per cent. for the technically ineffective cases are 21 and 16—i.e., about half. Likewise the curve of mortality shows for the former group after three years 46 per cent., after seven years 63 per cent., but for the latter 60 and 80 per cent. In fact, Curve I. shows what can be effected by ordinary sanatorium treatment for such cases as are suitable for pneumothorax treatment (the lower curve), and the plus that pneumothorax treatment gives—viz., the distance from the lower curve to the upper one.

All these numbers give plain evidence of the exceedingly favourable influence of Forlanini's treatment on suitable cases and of the really excellent results that can be obtained by this treatment in combination with sanatorium treatment. I do not know any other treatment that gives third-stage, sputum-positive cases a 33 per cent. chance of being able to work after seven years.

Of the patients discharged 1907–17, 22 are still undergoing pneumothorax treatment; 20 of them are able to work, 2 not.

FIG. 1.—*Curve of Working Capacity.*

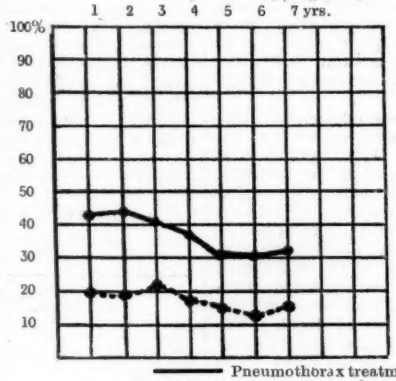
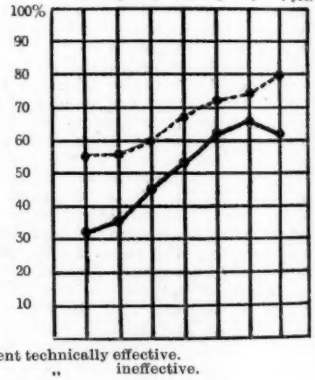


FIG. 2.—*Curve of Mortality.*



Pneumothorax treatment technically effective.
" " " ineffective.

Of real relapses in patients whose treatment had been intentionally terminated we have had only 4, to which may be added 2, in whom the treatment ought to have been continued, but was terminated by a mistake. The relapses supervened after a compression for—

> 1 year	... ... in 1 case,	3–4 years	... ... in 2 cases,
1–2 years	... ... " 1 "	4–5 "	... ... " 2 "

while the time that passed, before the relapse was evident, was:—

> ½ year	... ... in 2 cases.	3 years	... ... in 1 case.
1 "	... ... " 1 case.	4 "	... ... " 1 "
2 years	... ... " 1 "		

We have treated 4 of these patients again; in 1 of them a pneumothorax could be re-formed, the gas not being completely reabsorbed; but extension of the disease in the other lung supervened. In the other 3 cases our attempts to re-establish the pneumothorax had no result; 2 of them were treated with thoracoplasty, 1, according to Friedrich's method, with a negative result, the other, according to Sauerbruch's method, with a comparatively favourable result.

I have, by a careful analysis of these cases, tried to find why relapse supervened in one and not in another case, but I have failed. I think we may consider it a somewhat dangerous thing to cease the treatment before the lapse of more than one year, because one of the four compressions had only lasted one year. When peculiar circumstances favour it, in very recent cases when the lung has not fibrosed and when the pneumothorax is complete, it will perhaps be sufficient to continue the treatment for only one year; but usually at least two years' compression will be preferable. In chronic cases I am much afraid of discontinuing the treatment before three or four years, and even after four years relapses are, as seen from one of our cases, not impossible. The cessation of a pneumothorax is always, in a measure, a risk, so we must not blame our patients for wishing to continue the treatment when they have seen in their companions relapses after its cessation, and when they are well with their pneumothorax. In such cases it will usually be sufficient, when the treatment has lasted for

TABLE III.

Pneumothorax is maintained (1919) in—

1 for 11 years.	1 for 6 years.	4 for 3 years.
1 " 9 "	4 " 5 "	5 " 2 "
1 " 7 "	5 " 4 "	

Particular interest is, of course, attached to those whose treatment has been terminated and whose health during a number of years has been maintained. In January, 1919, 44 of the patients discharged 1907–17 with treatment terminated can be classed as able to work. The interval since the cessation of the treatment is seen from Table IV.:—

TABLE IV.

In 44 patients discharged 1907–17, who in 1919 were classed as able to work, pneumothorax treatment had been terminated—

1 ... 12 years ago.	5 ... 7 years ago.	6 ... 3 years ago.
1 ... 10 " "	3 ... 6 " "	6 ... 2 " "
2 ... 9 " "	7 ... 5 " "	7 ... 1 " "
3 ... 8 " "	2 ... 4 " "	1 ... ?

In these cases the compression has lasted in—

1 ... ... ½ year.	17 ... ... 2–3 years.	1 ... ... 5–6 years.
2 ... ... ½–1 "	7 ... ... 3–4 "	2 ... ... 6–7 "
11 ... ... 1–2 years.	2 ... ... 4–5 "	1 ... ... ?

All these patients now do their usual work without any regard to their previous illness, partly in very laborious professions.

some years, to inject gas every second or third month, and the inconveniences of these injections are mostly so slight that the sense of security given is cheaply bought. A patient who during several years has been treated with a pneumothorax with good results feels, apart from a little dyspnœa, quite well and is able to work like a healthy man, unless hard physical exertion is required. For instance, a busy medical practitioner has continued his work for five years without trouble, although he had to cycle during last winter's epidemic of influenza when benzene was scarce. The only real risk such a patient runs is that of pneumonia in the other lung. We have had one such case; the patient was a young medical man, who had been treated during six years for a practically hopeless condition, and had been able to finish his studies and do his hospital work. Perhaps he might have been saved if he had allowed the gas to be withdrawn from his pneumothorax, which he, being over-cautious, had kept superfluously large; but there was no chance of performing such an evacuation. The post-mortem examination in this case showed complete healing of the lung; there was a cavity completely compressed. Examination of a series of slides of its walls showed one single giant cell; but bacilli could not be found, and inoculation of a guinea-pig gave a negative result. This man could, no doubt, have let his lung re-expand long ago; at any rate, it would have been sufficient to maintain a very small pneumothorax, which would have allowed the "sick" lung to work again, while a thin space of air would have been kept up with a view to an enlargement should this be necessary.

In the case of incomplete but efficient compression it will usually be right to continue the pneumothorax treatment for good, unless the treatment is abandoned in favour of a total or partial thoracoplasty, which will, in many cases, be preferable.

The pneumothorax being complete, I now usually let the patients be treated for about five years. If then all is normal, if the patient's capacity for work is proved, and if he wishes it, I let the pneumothorax close, choosing the summer season for allowing the lung to re-expand, for the first months observing the patient very closely, if possible in the sanatorium; and no sooner do symptoms of relapse in the treated lung appear than I renew the injections of gas, but only in very few cases have I seen any reason to do so. After seeing the excellent results that can be obtained by thoracoplasty, I am not so afraid to discontinue the treatment; if a relapse occurs and the pneumothorax cannot be re-formed we can operate on the patient.

Three of our patients have been confined without relapse, one of them even twice, one pregnancy occurring before, the other after the cessation of the pneumothorax, which had lasted five years. In three cases pregnancy occurred so soon after discharge that I did not venture to let it continue.

Of alternating compression, first of one, then of the other lung, we have had 7 cases, 2 patients, discharged in 1918, being included. They all died except one, who first had his left lung compressed for eight months, with cessation in July, 1913, and in whose right side a pneumothorax was formed in January, 1914, which lasted 16 months. Since 1915 he has been quite well and able to work. Though such an alternating treatment in most cases will be without result, it is seen that in single cases it can be of use, and we therefore are justified in employing it, especially when there is a rather long interval between the cessation of the first and the beginning of the second treatment.

An effusion in the pneumothorax cavity is one of the most frequent complications; of our 143 patients 79 had an effusion in the sanatorium (31 large, 23 middle-sized, and 25 small); in 4 cases an effusion was found at the induction of the pneumothorax. It is of great interest to examine the influence of effusions on the final results. In Table V. the state in 1919 of those with and of those without an effusion is shown. It is astonishing that the results of the two series are practically identical, with a slight preponderance in favour of the dry pneumothorax cases. It is still more astonishing that many of the patients now completely fit for work have passed through severe suppurative pleurisies with tubercle bacilli in the pus, and persisting for several years.

TABLE V.—*The Influence of an Effusion on the Results.*

	With effusion.		Without effusion.	
	No.	Per cent.	No.	Per cent.
Able to work in Jan., 1919	31	37·3	24	40·0
Unable to work	4	4·8	1	1·6
Dead, Jan., 1919	48	57·8	32	53·3
Ill or dead from other causes, Jan., 1919	—	—	3	5·0

I hope that the facts now communicated may be sufficient to indicate the great importance of pneumothorax treatment in suitable cases. But I would again, in conclusion, emphasise that the results here mentioned are obtained by a combination of pneumothorax treatment with strict sanatorium treatment. It is easily understood that the best possible conditions for the "better" lung, of which, especially in the beginning of the treatment, much is required, are of importance, and these conditions are best found in a sanatorium. My patients, as a class, are comparatively well-to-do.

A surgical colleague remarked a couple of years ago that he hoped to become old enough to see the burial of pneumothorax treatment. He did not live long enough, however, and though he had lived ever so many years he would not have seen it. The pneumothorax treatment has got a permanent place as an important remedy in our therapeutic armoury, a place that only ignorance of the methods and its results can deny. It is not unjustly that Holmgren in his chapter in the Scandinavian Text-book of Medicine characterises it as the greatest progress made in the treatment of phthisis since Brehmer's and Dettweiler's time. I would be glad if the numbers here presented convince sceptics of the great importance of the method.

ON THE CLINICAL VALUE OF ROUTINE CEREBRO-SPINAL FLUID EXAMINATION IN THE DIAGNOSIS OF NERVOUS DISEASE.

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(From the Thompson Yates Laboratory.)

IN acute meningeal affections examination of the cerebro-spinal fluid forms a routine part of every clinical laboratory's working day, but not, as far as one can gather, in the more chronic neurological affections, though just as brilliant diagnostic results are claimed in such cases by an army of workers throughout America and the continent. I wish, therefore, to lay before the profession some results which have been obtained during over a year's work on material gathered from the various Liverpool institutions. These results will be treated in a purely clinical spirit, leaving the more technical part of the subject for a future paper. An outline only of the technique employed will be given.

Lumbar Puncture.

This operation, in my opinion, should never be performed unless provision is made for the patient to remain in bed during the ensuing 24 hours. The sitting-up position is, when possible, much to be preferred, and as a rule no anæsthetic, either general or local, is required. The choice of needle is a difficult one; in my own practice I have always two different kinds ready sterilised: a White-Jeanselm needle of platinum-iridium and a nickel needle of the ordinary Barker type. The former is to be preferred, but it has two objections: (1) that if the patient is abnormally fat or muscular or if the needle be introduced at too great an angle the thecal cavity may not be reached owing to

the shortness of the needle; (2) that as the grip of the instrument is not very large sometimes it will be found difficult to exert sufficient force to pierce the skin without bending the needle. On the other hand, the small size of the White-Jeanselm needle diminishes the pain of the operation and considerably lessens the risk of blood admixture due to accidental hæmorrhage. After the fluid has been withdrawn the patient should be placed in the recumbent position with the head low, and should remain in this position for over 12 hours. It may be noted also that the aperture made by the smaller needle will be less likely to cause epidural leaking with its consequent headache. This headache, which is fairly frequent, is the only after effect which I have noted. Sometimes it lasts only for one night but sometimes for many days; it is usually relieved by removing the pillows.

Examination of the Fluid.

1. *Cell count.*—It is most unfortunate that the cells in the cerebro-spinal fluid after withdrawal autolyse with considerable rapidity. Great care should, therefore, be taken to investigate the cytology as quickly as possible. In many cases, however, a delay of several hours must necessarily occur, and then it is my practice to stain the cells at the bedside, thereby rendering any autolysis impossible.

The easiest and most accurate method for the count is to draw up the staining fluid employed into a Zeiss leucocyte-counting pipette to the mark 1, and then the well-shaken spinal fluid up to the mark 11. It is well to allow the resultant suspension to stand for a few hours, as some of the cells stain very slowly and with the utmost difficulty.

For the count itself a Fuchs-Rosenthal counting chamber is employed. The total number of cells found in the 256 squares when divided by three gives the number of cells per cubic millimetre of spinal fluid.

I am accustomed to count also the number of red cells when these are present, as by prepared tables it can easily be ascertained how much blood admixture will vitiate the results of the other reactions. If blood is present in considerable quantities a fairly accurate estimation of any lymphocytosis which may be present can be arrived at by making a differential leucocyte count of the centrifugalised deposit stained by Leishman or methylene blue. As regards the different kinds of cells present little need be said, since their presence, as a rule, does not afford, as yet, any definite help in clinical diagnosis. By far the commonest cell met with in spinal fluid is the small lymphocyte.

A lymphocytosis can be safely regarded as being present when the cells number more than 10 per c.mm., though in my experience it is rare to find more than one cell in the total 256 squares in a normal fluid.

2. *Protein content.*—In normal cerebro-spinal fluid a small amount of protein is present; this is usually regarded as belonging to the globulin group. For the determination of protein excess I am accustomed to use three different methods. The object of using such a multiplicity of reagents is to check and control the result and also because in some cases it may be that different reagents precipitate different protein fractions. It is not sufficient merely to ascertain whether a protein excess is present or no, but an attempt should also be made to determine the amount of this excess. The easiest method for gauging this is by employing varying dilutions of the fluid and noting the highest dilution in which obvious precipitation occurs with each of the reagents. The three reactions are as follows:—

1. The Ross-Jones test, which consists in adding carefully to spinal fluid an equal volume of a saturated solution of ammonium sulphate. If protein excess is present a white ring will form at the junction of the two fluids.

2. The Pandy test. A 10 per cent. solution of carbolic acid is added to the spinal fluid, when, if the latter is abnormal, a white cloud will appear.

3. Equal quantities of spinal fluid and a 10 per cent. solution of sulpho-salicylic acid are mixed together. Even in normal fluids a faint white cloud may be seen occasionally as far as the 1/10th dilution. Precipitation occurring in dilutions higher than this may be regarded as pathological.

Of course, if there is considerable blood admixture in the fluid the above tests will be valueless. It is surprising, however, to note how comparatively large this admixture must be to show any abnormality in a normal fluid. When small amounts of extraneous blood only are present no dilutions need be made, and one must content oneself with saying merely that protein excess is or is not present.

Naturally, as the quantity of spinal fluid to be examined is strictly limited the above tests should be performed in the smallest tubes possible. (Personally, I prefer Dreyer's agglutination tubes.)

3. *Wassermann reaction.**—The technique used is that advised by the Medical Research Committee and known as method 4. Whenever possible examinations should be made both of the blood and of the spinal fluid. Regarding the former nothing need here be said; it is only with the reaction as given in spinal fluid that the following remarks are concerned. It appears that prior to 1911 only one dilution of spinal fluid was employed for this test, and as this was only 0·2 c.cm. many neuro-syphilitic cases were missed. In this work five strengths of spinal fluid were used—viz., 1 c.cm., 0·5 c.cm., 0·2 c.cm., 0·1 c.cm., and 0·05 c.cm. By this means not only can the presence of neuro-syphilis be diagnosed, but also some hint as to its type and severity may be gathered. Thus, for example, in my experience a completely positive reaction in 0·05 c.cm. of fluid means either general paralysis or a severe grade of cerebro-spinal syphilis. The technique employed is exactly similar to that used in the serum Wassermann reaction, with the one exception that the fluid is not heated. It should be noted that a normal fluid some days old, even though kept in the ice-chest, may give a positive reaction in the 1 c.cm. dilution; this should be neglected. Nothing less than a completely positive result in the 1 c.cm. dilution is of value in an untreated case. If the fluid has been kept some time it is safer to leave out the 1 c.cm. dilution altogether. Contamination with organisms also destroys the value of the reaction.

4. *The colloid gold test.*—At first, owing to difficulties of preparation, this test was not used, but I was able to interest a well-known London firm in the matter, and now they are turning out a reliable reagent. I now use this reaction as routine in all spinal fluid examinations. The value of this test, in my opinion, is second only to that of the Wassermann reaction, and its aid should always be sought. For the technique of the procedure the reader is referred to the literature dealing with the subject. A few remarks, however, regarding the reading of the results will not be out of place in a paper such as this since the clinician must be in a position to interpret the reports sent from the laboratory. In brief the method is as follows:—

Colloid gold is a red solution, its colour depending upon colloid particles in suspension. When certain spinal fluids are mixed with this solution the colloid particles are precipitated with the result that the red colour disappears. When the precipitation is complete the solution will be rendered colourless, when incomplete colour changes varying from red-blue to violet or blue will be noted. These colours are numbered as follows: red = 0, red-blue = 1, violet = 2, blue = 3, bluish-white = 4, and colourless = 5. Ten dilutions of spinal fluid are made varying from 1/10th to 1/5120. In each examination, therefore, there will be ten tubes, the colours of which as represented by the above numbers must be noted. The results are read from left to right, beginning with the 1/10 dilution. In general paresis a typical reading would be 5555554210. This is known as the "paretic curve." In tabes the figures are usually 2221110000, or some slight variation of this. In cerebro-spinal syphilis 1223320000 is fairly typical. These last two results are usually spoken of as the "leutic zone" curve.

Blood admixture in fairly small quantities may give a leutic zone curve in a normal fluid. Allowances, of course, must be made for this.

5. *Other tests.*—I have employed many other reactions in addition to those described above, but these so far with few exceptions are not of proved value, and as yet need not be discussed in a clinical paper. The sugar content in neuro-syphilitic cases is almost always normal. The Boveri test is sometimes of value. This depends upon the fact that when an equal volume of 0·1 per cent. potassium permanganate solution is added to an abnormal spinal fluid a yellow colour develops in 2–6 minutes. The colour of the spinal fluid should be noted, and also the amount of foaming when the fluid is shaken often forms a useful indication as to its pathological nature. It is not accurate to regard the rate of flow of the escaping fluid as a criterion of intrathecal pressure.

* For all the observations under this heading and for constant assistance in the practical side of the whole investigation I am indebted to my wife, Dr. Phœbe M. Bigland.

From a perusal of the above tests it will be seen that if results are only regarded as certain when all the reactions are in agreement the possibility of error is practically excluded.

Clinical Results.

In order to investigate for myself the clinical value to be obtained from the combined use of the above reactions I pursued the following plan. Through the kindness of the superintendent and medical staff of the Lancashire County Asylum, Rainhill, I was supplied with a series of samples of blood and spinal fluid. As previously arranged no diagnosis was sent with the specimens and no hint whatever was given as to their probable nature until after the pathological report had been sent in. I never saw the patients themselves except in one case in which my clinical diagnosis was at fault and the asylum authorities were right as shown afterwards by the laboratory findings.

Enough has been said to show that this test was more searching than any which could occur in ordinary laboratory practice, where, of course, pathological findings are regarded only as one factor in a complete diagnosis. The following table shows clearly the results of this test.

Case No.	Protein.	Cells per c.mm.	Serum Wass.	Fluid Wass.*	Gold colloid.	(*a*) Laboratory diagnosis; (*b*) clinical diagnosis.
1	++	–	++	++	—	(*a*, *b*) C.S.
2	N.	N.	++	–	—	(*a*) Prob. not N.S.; (*b*) ? G.P.†
3	++	38	++	++	—	(*a*, *b*) G.P.
4	++	15	++	++	—	,, ,,
5	V.s.+	N.	–	++	—	(*a*) N.S., not G.P. (*b*) ?†
6	++	++	++	++	—	(*a*, *b*) G.P.
7	++	88	++	++	—	,, ,,
8	++	36	++	++	Paretic c.	,, ,,
9	++	58	++	++	,,	,, ,,
10	V.s.+	1	–	–	Normal.	(*a*) Not N.S.; (*b*) D.P.
11	++	–	++	++	Paretic c.	(*a*, *b*), G.P.
12	++	45	–	–	2211000000	(*a*) Prob. M., no S.; (*b*) Ch. M., not G.P.
13	++	2	++	++	Normal.	(*a*) Not G.P., prob. chronic C.S.; (*b*) C.S. not G.P.
14	++	44	++	++	Paretic.	(*a*, *b*), G.P.
15	++	186	++	++	Leutic zone c.	(*a*) C.S. not G.P.; (*b*) ? G.P., ? C.S.
16	N.	2	–	–	Normal.	(*a*) Not N.S.; (*b*) not G.P.
17	++	44	++	++	Paretic c.	(*a*, *b*), G.P.
18	–	++	++	++	3333430000	(*a*) Prob. C.S., ? G.P. (*b*) prob. G.P.

*Fluid Wass.**—In all dilutions except Case 5 (in first three dilutions) and Case 13 (+ ~~+~~ in first two dilutions, partial + in others).

† Post-mortem reports on Cases 2 and 5 were "no signs of G.P." On Case 5 post mortem showed marked vascular changes and hæmorrhages in pons.

N, normal. V.s.+, very slight. –, negative. C, curve. C.S., cerebral syphilis. G.P., general paralysis. N.S., neuro-syphilis. D.P., dementia præcox. Ch.M., chronic meningitis.

It will be seen that there is a remarkable agreement between the pathological findings and the clinical diagnosis, which was not known by me at the time of the blood and spinal fluid examinations. In these 18 cases there was not one grave discrepancy noted between the two diagnoses.

Additional evidence as to the accuracy of diagnosis was furnished later by post-mortem examinations on Cases 2 and 5.

Case 2.—When the brain was examined macroscopically there was evidence of general paralysis, and the pathologist to Rainhill Asylum, Dr. G. A. Watson, was as disappointed as I was, since the laboratory diagnosis had been: "Not general paralysis, probably not neuro-syphilis at all." To my delight, however, a few days later Dr. Watson wrote me a letter with the information that on examining microscopic sections of the brain no trace whatever of general paralysis could be discovered.

Case 5.—In this a diagnosis of "probably not neuro-syphilis at all" had been given, and post-mortem examination showed merely arterio-sclerosis of the cerebral vessels with a hæmorrhage into the pons.

With these results to give me confidence, the examination of the blood and cerebro-spinal fluid during the past year has become routine practice in the majority of my neurological cases, and many specimens also have been sent from the Royal Infirmary, Liverpool, to the honorary physicians of which hospital I beg to tender my thanks. While it would not be possible to discuss in detail all the results obtained, it will probably be useful to present notes of some of the more interesting groups of cases.

Cerebral Vascular Lesions.

When cerebral vascular lesions are due to syphilis there are usually obvious changes in the cerebro-spinal fluid. In a few cases, however, there may be comparatively few abnormal findings in the fluid, but in my experience the Wassermann reaction is always given in these cases, though the globulin and lymphocyte estimations may be almost normal. Upon looking over the notes of many such cases one has been struck with the change in diagnosis which was necessary as a result of the facts supplied by the laboratory. I append a few examples:—

CASE 1.—A young man, aged 23 years, awoke one morning to find that he was paralysed down one side of his body and that he was unable to speak. Though he denied syphilis a clinical diagnosis of syphilitic cerebral thrombosis was made. When the blood and spinal fluid were examined not a trace of syphilis was discovered. It was afterwards found that the hemiplegia occurred just after an attack of influenza. Without the laboratory examinations this man undoubtedly would have been subjected to a prolonged course of antisyphilitic treatment, which, of course, could have proved of no avail, and would have done actual harm by destroying his peace of mind.

Contrast this case with the following:—

CASE 2.—A young man, aged 26, while walking home one evening suddenly became ataxic so that he was thought to be drunk. In the morning he awoke to find that he was paralysed down one side of his body and that he had some aphasia. He denied venereal disease. His spinal fluid showed a great excess of globulin, a marked lymphocytosis (174 cells per cubic millimetre), and a Wassermann reaction completely positive in all dilutions. The case was, therefore, obviously one of syphilitic cerebral thrombosis, and I understand that the patient made a good and rapid recovery under antisyphilitic treatment.

In most cases of cerebral hæmorrhage no signs of syphilis are present, but occasionally, as in the following case, one is surprised at the laboratory findings.

CASE 28.—A man, aged 52, showed the following signs: Hemiplegia, enlarged heart, metallic aortic second sound, thickened vessels, raised blood pressure, anæmia, œdema of lower eyelids, and albumin in the urine. He was also suffering from confusional insanity. The diagnosis was obviously a cerebral hæmorrhage due to chronic kidney disease. The examination of the spinal fluid, however, showed that in reality the case was one of cerebral syphilis.

Even in the aged neuro-syphilis cannot be excluded—for example:—

CASE 40.—A man, aged 70, with advanced arterio-sclerosis and severe headache showed a spinal fluid with globulin excess and the Wassermann reaction completely positive in all dilutions.

Locomotor Ataxia.

In the early stages this condition is not always an easy clinical diagnosis. The following cases may be of interest:—

CASE 2.—A woman, aged 35, showed marked ataxia of the legs of rapid onset. The knee-jerks and ankle-jerks were absent and there was difficulty in holding water. A tentative diagnosis of early tabes was made. The cerebro-spinal fluid on examination was found to be absolutely normal and the Wasserman reaction both in the blood and in the spinal fluid was completely negative. Tabes, therefore, was excluded. When seen later there was some improvement in her condition, and the knee-jerks had returned.

CASE 4. A man, aged 40, marked ataxia of the legs with some spastic phenomena. Both the blood and spinal fluid were absolutely normal and the condition was, therefore, not due to neuro-syphilis of any kind.

CASE 5. A man, aged 40, with ataxia of legs, Argyll Robertson pupil on one side, bladder control imperfect, denies syphilis. Cerebro-spinal fluid showed obvious signs of neuro-syphilis. Under antispecific treatment he greatly improved and is now starting a business of his own.

CASE 11. Clinically a typical tabes. Cerebro-spinal fluid examination as follows: Globulin, marked excess; cells=40 per c.mm.; Wassermann reaction, completely positive in 1 c.cm., 5 c.cm., and 2 c.cm., almost completely positive in 0·1 c.cm., and positive in 0·05 c.cm.; colloid gold 1233200000. Pathologically also this is a typical tabes.

General Paralysis.

In the early stages and even later general paralysis is sometimes notoriously difficult to diagnose. Such cases emphasise, perhaps more clearly than any others, the paramount importance of cerebro-spinal fluid examinations.

CASE 58. Male, 39 years of age; during the war he was torpedoed and afterwards became very nervous and shaky. He was diagnosed and pensioned as neurasthenia. I examined him upon one of the pensions board and found that his pupils were unequal. Though he denied syphilis, the laboratory findings in his case were as follows: Globulin, marked increase; cells, 171 per c.mm.; Wassermann reaction in the blood completely positive, in the spinal fluid completely positive in 1 c.cm. and 0·5 c.cm., partially positive in the remaining dilutions; colloid gold, 4543100000.

The diagnosis here, then, was certainly neuro-syphilis, with the possibility of general paralysis. Antisyphilitic treatment was vigorously pursued, but without effect; and only to-day, as I write these lines, I have received a letter from this patient, who is now in the South of England, saying that his condition is growing worse and that he wishes to return to Liverpool for further advice.

CASE 62.—Male, aged 37, admitted to hospital with pneumonia, became maniacal and died. The cerebro-spinal fluid was withdrawn before death, but was left in the ice-chest and forgotten. At the post-mortem examination slight pneumonia was found, but no sufficient cause for death was discovered till the spinal fluid was examined and gave the following results: Globulin markedly increased; the cells were not counted because the fluid was three days' old; Wassermann reaction completely positive in all dilutions; colloid gold, 5555541100. This was undoubtedly a clear case of general paralysis.

There is no object in multiplying examples of cases where neuro-syphilis had been diagnosed in the wards and disproved in the laboratory, and vice versa. Out of 67 consecutive cases thought to be neuro-syphilis after laboratory examination 38 showed that the clinical suspicion was well founded, and 29 showed no evidence of syphilis at all. These figures alone show the paramount importance of such examinations.

Intracranial Tumours.

Upon looking over the notes of my first 112 cases I find that seven cerebro-spinal fluids were sent to me with the diagnosis of intracranial tumour.

CASE 8.—Male, aged 54, double optic neuritis, vomiting, mental changes, &c. A history of syphilis 20 years ago; clinical diagnosis, gumma of brain. The cerebro-spinal fluid examination showed no evidence of neuro-syphilis, and the presence of a gumma was therefore excluded. On account of certain of the reactions, and also because of the yellow colour of the spinal fluid, together with the clinical findings, the following diagnosis was made in the laboratory: "Hæmorrhage into a non-syphilitic brain tumour." Post-mortem examination revealed a glioma in one frontal lobe with a hæmorrhage into it.

In five out of the remaining six cases the spinal fluid showed unmistakable evidence of the gummatous nature of the intracranial tumour. The result in ascertaining whether an intracranial tumour is a gumma or not is obviously of the highest importance both as regards advising operative interference and settling the question of prognosis. The old method of waiting for the results of iodide medication is most unsatisfactory, as valuable time is lost and the patient's sight may be gone for ever. The only certain and quick method of deciding upon the gummatous nature of the tumour is by employing the methods already described. It must not be forgotten, however, that the operation of lumbar puncture in the case of subtentorial tumours is not without risk.

Conclusion.

In conclusion I would urge the following points: 1. That no patient having nervous symptoms, even though there is a clear history of syphilis, should be regarded as a case of neuro-syphilis until proved so by cerebro-spinal fluid examination. 2. That no case showing signs of organic nerve disease, and in which no suspicion of syphilis is entertained, should be regarded as non-neuro-syphilitic until proved so. 3. That no case with signs of organic nerve disease and a positive Wassermann reaction in the blood should be diagnosed as neuro-syphilis until the cerebro-spinal fluid also has been examined. 4. That no case with signs of organic nerve disease should be regarded as not neuro-syphilis merely because his serum Wassermann is negative. 5. In the diagnosis of neuro-syphilis by the above methods the combined evidence of all the tests should alone be relied upon. On no account should the diagnosis be made upon the result of one test alone.

There only remains the pleasant duty of thanking Professor E. E. Glynn, of Liverpool University, for granting me every facility and kind consideration in the carrying out of this work.

DIPLOCOCCUS CRASSUS AND MENINGITIS,

ASSOCIATED WITH A CASE OF FRACTURED BASE.*

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MEDICAL literature supplies but few recorded cases of meningitis in which infection is attributed to or associated with the presence of *Diplococcus crassus*—a Gram-positive organism growing readily at 20° C. Its occurrence was first reported by Jäger[1] in 1895 during an epidemic of cerebro-spinal fever, and it was recovered the next year by Heubner[2] in three out of five cases of the disease. At that time this diplococcus was regarded as a variety of the meningococcus of Weichselbaum and was given the title of the meningococcus of Jäger, who described his modification as a "mutable" meningococcus, and stated that both organisms were agglutinated by the same serum.

In 1896 Heubner[2] and Finkelstein demonstrated Jäger's "meningococcus" in the puncture fluid in nine cases of cerebro-spinal fever in which the diagnosis was confirmed at autopsy. The identity of the organism was established by comparison with Jäger's original preparations and also by culture. On injection into animals it caused inflammatory processes in the meninges; the result was positive in goats, doubtful in young dogs, and negative in rabbits and guinea-pigs.

Baginsky in 1901 pointed out the differences in the morphology, staining, and cultural reactions of this organism and Weichselbaum's meningococcus, and noted also the biological differences in regard to their behaviour to the various sugars.

Von Lingelsheim[4] at a later date (1908) reported the association of the *Diplococcus crassus* with the meningococcus as a common occurrence in cases of cerebro-spinal fever during the epidemic in Upper Silesia in 1904.

Von Hibler[3] had previously (1907) reported three cases of cerebro-spinal fever in which he obtained in culture from the meninges and ventricular fluid both translucent colonies of Gram-negative diplococci and opaque colonies of Gram-positive cocci, but the former were not regarded as meningococci, and proved by experiment to be pathogenic to guinea-pigs and rats; they, moreover, grew somewhat readily on the surface of glycerine agar, penetrating to the deeper portions of the agar, and growth was also obtained on the surface of glucose gelatin at 24° C.; and this account of the association of the Gram-negative diplococcus and Gram-positive coccus cannot be regarded as one of *Meningococcus* and *Diplococcus crassus*.

Von Lingelsheim also described the presence of *Diplococcus crassus* in the ventricular fluid in tuberculous meningitis and in a case of acute meningitis following trauma. In the latter, as a result of a severe blow on the head, meningitic symptoms developed, with high fever and vomiting. *Diplococcus crassus* was obtained in large numbers from the lumbar puncture fluid, both in film preparations and culture. Von Lingelsheim found that *Diplococcus crassus* was agglutinated not only by its homologous serum but also by meningococcus serum; on the other hand, the meningococcus was not agglutinated by *Diplococcus crassus* serum. He confirmed, however, the differences noted by Baginsky, Allrecht, and Ghon, not only in the morphology, staining, and cultural reactions, but also the biological differences of the two organisms, such as their behaviour to sugar tests.

Bettencourt is quoted as finding that *Diplococcus crassus* and Jäger's modification are agglutinated by normal serum in strong dilutions, but von Lingelsheim claimed that this characteristic was lost when the organism was grown on blood containing media.

Karl Stoevesandt[5] also in 1908, maintained that von Lingelsheim's investigations had proved beyond doubt that in addition to the true infective agent in meningitis

* A paper read at the Cambridge meeting of the Pathological Section of the British Medical Association, in the discussion on the Bacteriology of Cerebro-spinal Fever, July 2nd, 1920.

other organisms were often present in the diseased meninges, the most notable being *Diplococcus crassus*, regarded as identical with the Jäger-Heubner "meningococcus."

Cultural Characters.

Stoevesandt obtained in cultures from two cases of meningitis organisms which formed fairly opaque colonies on agar and ascitic agar, but gave a doubtful response to Gram's stain. His cultures provided two strains of diplococci—one of which liquefied gelatin and coagulated milk, the other resembled the Jäger-Heubner coccus in its morphological and cultural characters. Neither of them was agglutinated by meningococcus serum, and although Stoevesandt considered that it would probably be incorrect to describe this coccus as *Diplococcus crassus*, he places it in the category of organisms which have led to grave errors in regard to the meningococcus. He gives the results of examination of the cerebro-spinal fluid in three other cases in which only a few uncertain diplococci, were present in the direct preparations. Cultures yielded what he describes as three strains of diplococci, Nos. I. and II. resembling each other, No. III. showing deviations from both, and presenting apparently pleomorphism and involution forms. The three strains were all Gram-positive, the component cocci being round or oval, occurring as isolated or double elements, and larger, more deeply-staining forms than the rest, and occasionally arranged in chains; in addition there appeared rod forms of varying length, and also slightly curved forms and fusiform structures, the latter more evident in strain III.

The cultural characters were as follows. Gelatin: Good growth at room temperature; no liquefaction with Nos. I. and II.; liquefaction with No. III. Agar and glycerine agar: Small whitish colonies with smooth margins and faint brown staining. Broth: Moderate opacity, slight sediment. Animal experiments: With strains I. and II. intravenous inoculation of mice caused temporary illness, but subcutaneous inoculation had no effect. Strain III. was, however, pathogenic for mice and caused death in 20 to 36 days, but had no effect on guinea-pigs. The variations found by Stoevesandt in the diplococci obtained from his cases obviously, as he says, did not justify their exact classification or as belonging to *Diplococcus crassus*.

The Work of Harvier.

Harvier,[6] in 1911, described a case of rapidly fatal meningitis in which *Diplococcus crassus* was obtained in pure growth from the cerebro-spinal fluid by lumbar puncture. The fluid yielded in direct preparation a number of polymorphonuclears and diplococci which were Gram-positive, and gave, after 24 hours' cultivation on various solid media, rounded, opaque, glistening white colonies composed of diplococci, for the most part in massive grouping. Each diplococcus was formed of two ovoid elements in apposition to each other, "like coffee grains." All were Gram-positive. With sugar cultures the diplococcus yielded acid fermentation with glucose, levulose, galactose, saccharose, maltose, and lactose, but no change with mannite, dulcite, inulin, arabinose, and raffinose. It yielded no agglutination with antimeningococcal serum, thus contrasting with the unexpected results obtained by previous writers, particularly von Lingelsheim. The organism was found to possess marked resistance and still retained its vitality after two months.

Inoculation of 1½ c.cm. broth cultures into mice, rabbits, and guinea-pigs, intravenously and intraperitoneally, and intracranially in the latter animals, all proved negative. But a rabbit already inoculated with an intravenous injection of 10 c.cm. broth culture on May 25th was trephined by him on June 21st and received ½ c.cm. of emulsion of the growth on gelatin into the brain. On June 25th the animal was seized with convulsions. Blood taken from the auricular vein yielded a pure growth of *Diplococcus crassus* in 24 hours and the animal was killed the same day.

Post mortem there was found congestion of both lobes of the lungs. There was no trace of exudate on the brain or cord. The cerebro-spinal fluid was very turbid, it showed a great many lymphocytes and many Gram-positive diplococci. Culture yielded a pure growth of *Diplococcus crassus*. Histological examination of the brain and spinal cord showed a generalised meningeal reaction with perivascular collections of mononuclear cells and Gram-positive diplococci, which were also found in the dilated hepatic capillaries. The animal's serum agglutinated the organism isolated up to 1 in 100 dilution.

Macé,[7] in his "Traité Pratique de Bactériologie," 1912, gives an account of the organism under the title of "Diplococcus Crassus de Lingelsheim," and refers to its having been regarded originally as a variety of the meningococcus of Weichselbaum, and therefore called the meningococcus of Jäger. He describes it as often found in the cerebro-spinal fluid or meningeal exudate in meningitis, alone or associated with the meningococcus, and also as occurring in the mucus of the naso-pharynx. Morphologically the diplococcus is stated to be a little larger than the meningococcus, and is always Gram-positive; culturally it grows readily at 20° C., slowly on gelatin at first, but later yields abundant colonies which are smaller than the meningococcus, grey to the naked eye, brownish under the microscope, and without producing any liquefaction. It ferments glucose, maltose, lævulose, saccharose, and lactose. Macé quotes it as being constantly agglutinated by antimeningococcal serum even up to 1 in 200 dilution, and states that this property, due to the presence of secondary group agglutinins, is lowered by the age of the culture. On the other hand, the meningococcus was never agglutinated by anticrassus serum and complement-reaction tests proved negative. He also alludes to the marked resistance of the organism, which retains its vitality and virulence for a long period.

G. Rosenthal[10] has quite recently (1918) described a case of cerebro-spinal fever in which lumbar punctures yielded turbid specimens of fluid, rich in polynuclear cells, containing albumin, and usually giving the sugar reaction with Fehling's fluid. Direct preparations rarely showed intra- and extra-cellular diplococci, and cultures yielded "Meningococcus crassus de Jäger." But, unfortunately, no particulars are given as to the morphological, staining, or cultural characters of the diplococcus. Cure was claimed to have been effected by intrathecal injections of solutions of chloride and citrate of soda, 7 and 8 g. respectively per litre.

Isolation of the Organism in a Case of Fracture of the Base of the Skull.

Examination of the cerebro-spinal fluid in the following case of meningitis, complicating fracture of the base of the skull, resulted in the isolation of two strains of cocci, one of which may be regarded as conforming with *Diplococcus crassus* in its morphological and cultural characters:—

A workman, aged 50, employed in furniture removal, on Jan. 8th fell while handling a heavy article and struck the right side of his head. Blood is said to have spurted from the right ear at the time. He was taken to the neighbouring cottage hospital, where fracture of the skull base was diagnosed, but as the patient became maniacal he had to be transferred to the infirmary. There he made fair progress, and four weeks after the accident returned at his own request to his home in London, travelling by train and tram. His mental condition was described as rational, but dull, and not quite normal. He made no attempt to return to work, but was feeling well enough to take walks. He complained of headaches from the time of his return home, and on March 20th they had increased so much in severity that he was obliged to take to his bed a day or two later. He was admitted to the local borough infirmary on March 27th in a state of subcoma. It was said that there had been no convulsions, and there was no evidence of paralysis and no optic neuritis.

Examination of cerebro-spinal fluid.—Lumbar puncture on March 30th yielded about 10 c.cm. of apparently clear, colourless fluid, which was forwarded the same day to the Pathological Laboratory of the London County Council and examined within four hours of collection. Chemical examination showed the presence of albumin in considerable quantity, amounting to 0·07 per cent. by Aufrecht's albuminometer. Fehling's solution was readily reduced. There was no clot formation on standing. Centrifugalisation yielded a visibly turbid deposit, from which film preparations were made and stained with Jenner's stain, by Gram's method, and for tubercle bacilli. Small quadrilateral crystals of doubtful origin were present in fair numbers, together with leucocytes considerably in excess of the normal, the majority being lymphocytes (79 per cent.), endothelial cells (12·5 per cent.), and polymorphs (8·5 per cent.), and red blood corpuscles. A few scattered diplococci, definitely Gram-positive and not intracellular, were readily seen without any

prolonged search. Careful examination failed to show any tubercle bacilli.

Cultural examination.—Five drops of the fluid were inoculated on to the surface of a plate of Gordon's medium. After 24 hours' incubation at 37° C. the area occupied by each drop yielded a collection of discrete round colonies, which under the hand lens were seen to be composed of two types: one, raised dense white with sharply defined edge about 2 mm. in diameter (Type II.) and the other (Type I.) somewhat smaller, opalescent, with fading margins. Subcultures were made on to ordinary agar-agar slopes from each of the two types of colonies. Film preparations showed Type I. to be composed of a small Gram-positive coccus measuring 0·6–0·8μ and showing no characteristic grouping; it was regarded as a staphylococcus and a possible contamination. Type II., also strongly Gram-positive, consisted of a large rounded diplococcus measuring 1–1·2μ with the opposing surfaces of each half in close apposition; its appearance suggested a resemblance to *Diplococcus crassus*. At this stage no particulars had been provided as to the past history of the case. The result of examination of the fluid was reported to the infirmary with a tentative opinion expressed in favour of a chronic meningitis—type indeterminate.

The further course of the case was of brief duration. The patient died without regaining consciousness on April 1st, just 12 weeks after the accident. Post-mortem examination was performed the following day at the infirmary and revealed: 1. Clear evidence of a still unhealed fracture at the middle fossa of the skull base on the right side. 2. A diffuse chronic lepto-meningitis, shown by thickening and opacity of the membranes. There was no purulent exudate and no evidence of tubercle. 3. Well-marked hydrocephalus affecting the lateral, third and fourth ventricles as the result of obstruction to the foramen of Majendie by the chronic lepto-meningitis. It was unfortunate that owing to the Easter holiday there was no opportunity of obtaining further material for bacteriological investigation post mortem. However, the cultures obtained from the lumbar puncture fluid were followed up for the purpose of confirmatory identification with various subculture tests.

Cultures from lumbar puncture fluid.—Type I., resembling a staphylococcus, grew readily at 20° C. on gelatin, producing slow liquefaction, commencing after 24 hours. In litmus milk at 37° C. there was acid formation and complete coagulation. Sugar reactions: lactose, acid; glucose, acid; mannite, acid; dulcite, no change; saccharose, acid; maltose, acid; galactose, acid; lævulose, acid.

Type II., resembling *Diplococcus crassus*, also grew readily at 20° C. on gelatin, but without liquefaction. In litmus milk at 37° C. there was slight acid formation, but no coagulation. Sugar reactions: lactose, acid; glucose, acid; mannite, slow acid formation; dulcite, no change; saccharose, slow acid formation; galactose, acid; lævulose, acid; maltose, slow acid formation.

Animal inoculation experiments were carried out, through the kindness of Dr. R. St. J. Brooks, at the Lister Institute, and Major H. M. Perry, R.A.M.C. at the R.A.M. College, Millbank. The former inoculated 1 c.cm. of 24 hours' broth cultures of strains I. and II. into two guinea-pigs without producing any effect. At the R.A.M. College two mice were inoculated subcutaneously with 0·2 c.cm. and 0·5 c.cm. of a 24 hours' broth culture of strain I. (*Staphylococcus albus*) and the same doses of strain II. (i.e., *Diplococcus crassus*) were injected into two other mice. The smaller doses in each case proved negative, but with the larger doses both mice died, after an interval of 6 weeks with strain I. and of 2 months with strain II. Further examinations are being made. A guinea-pig was also inoculated intraperitoneally with 0·5 c.cm. of strain II., with completely negative results.

Agglutination tests were carried out with saline emulsions of the two strains of cocci against meningococcal sera Nos. I., II., III., and IV. and control human serum, and yielded quite negative results.

For confirmation of these results I am much indebted to Major A. S. W. Bell, R.A.M.C. He failed to obtain any trace of agglutination of either strain with the four types of meningococcal sera in dilutions of 1 in 50 upwards.

Remarks.

(1) Meningitis, following on fractures of the middle fossa of the skull base which do not prove rapidly fatal, is regarded as one of the serious infective complications most likely to occur, the other and perhaps less common being extradural abscess and cerebral abscess. It may develop as the result of almost invariable rupture of the tympanic membrane, and consequent otitis media, with extension of inflammatory infection to the meninges.

Meningitis may be limited to the dura mater and localised to form an extradural abscess, but laceration of the dura may lead to spread of infection to the pia-arachnoid membranes and the development of a diffuse lepto-meningitis. This, according to Pringle,[8] may occur in three days or be delayed for three weeks or longer. In the case recorded here meningeal symptoms did not become pronounced until eight to ten weeks after the accident, and the subsequent course of the case is explained by the chronic form of lepto-meningitis and condition of hydrocephalus, together with a total absence of purulent exudate, found post mortem.

Trotter[9] states that the graver forms of meningitis are an uncommon event in fractures of the skull base, and that there is reason to suppose that minor grades of meningeal infection occur frequently and are recovered from.

(2) The changes found in the cerebro-spinal fluid in the case of the patient recorded pointed, in the absence of any history, to a chronic form of meningitis, particularly the character of the cell deposit, largely composed of lymphocytes. Although open to question on the score of possible contamination, the discovery of Gram-positive cocci in direct film preparations from the cell deposit within four hours of withdrawal of the fluid, and the subsequent appearance in culture of the two strains of cocci described, seem to justify the conclusion that these organisms, originally saprophytic and of low virulence, gained access directly from the external auditory meatus to the cerebral membranes.

(3) The severity of the damage to the tissues at the seat of injury may be regarded as having been productive of a lowering of local resistance sufficient to enable the invading saprophytes to acquire necessary virulence and pathogenicity, and thus become responsible for a chronic lepto-meningitis. It is possible also that the recovery of such saprophytic organisms, notably *Diplococcus crassus* in the recorded cases of cerebro-spinal fever, may be due to primary or secondary invasion of the meninges from the naso-pharynx or auditory meatus.

(4) Confusion as to the identity of the organism first described by Jäger and Heubner prevails in the original and later accounts given by Lingelsheim and Stoevesandt of the *Diplococcus crassus*. Particularly is this the case with reference to its quite unexpected behaviour and reported response to agglutination by antimeningococcal serum, the correctness and accuracy of which one can but doubt in the face of up-to-date and more exact observations in agglutination phenomena. Better definition is, however, derived from more recent descriptions of Harvier and Macé, although the latter in his account still quotes Lingelsheim's positive agglutination results as a feature of *Diplococcus crassus*.

(5) The two strains of cocci isolated from the cerebro-spinal fluid of the case here reported—No. I., apparently *Staphylococcus albus*, and No. II., suggested as *Diplococcus crassus*—conform in many respects to those obtained by Stoevesandt in association with his two cases of meningitis quoted above. Closer confirmation of the identity of No. II. is provided by the account of the case given by Harvier, whose description of the morphological and cultural characters and negative response to agglutination of the organism he isolated as *Diplococcus crassus* closely agrees with the behaviour of the diplococcus which I now bring to your notice.

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THE ORIGIN OF CANCER.

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THERE are few subjects in medicine more obscure than the origin of cancer, using the term as implying a malignant overgrowth of epithelial tissues, and, notwithstanding all the thought and labour expended, there is to-day no consensus of opinion regarding it. From whatever standpoint the subject is approached I am in agreement with those who consider cancer should be studied on the broadest scientific lines as a biological phenomenon, and not simply as a disorder affecting man. I have devoted many years to the study of the clinical and pathological manifestations of this terrible malady, both in man and the lower animals. As the result of that experience I have been driven to the conclusion that cancer is not a specific disease due to the action of a special parasite, but a condition dependent on a disordered growth of epithelium. This condition, which arises in damaged tissues, results from injury, physical or chemical. I consider the most frequent cause is to be found in the subtle activities of various micro-organisms whose toxins damage the tissue cells; also that cancer may be a remote sequel of microbic infection and a terminal phase of inflammation. It is in reality a form of tissue-degeneration. I have succeeded in tracing microscopically every step in the development of the morbid process from its inception, and in this brief communication, which is concerned with the origin of cancer, I will endeavour to describe them, reserving their demonstration for another occasion. I intend here to approach the origin of cancer from the clinical standpoint, but, before entering upon a consideration of its pathology, briefly to review the distribution and clinical features of the disorder, and also the circumstances under which it arises.

Distribution of Cancer.

The distribution of cancer in man may be said to be universal. It is to be met with amongst civilised communities of all grades, in all countries, living at both high and low altitudes on every variety of soil and under every condition of climate. In this country, according to Haviland,[1] it is most prevalent in low-lying districts with damp or swampy soils, though it has been pointed out that he did not take into consideration the age-distribution of the populations. Cancer is not uncommon in animals, both cold and warm-blooded, in either the domesticated or wild state. Modern research has discovered the prototype of the condition in fish, and traced its biological descent in the reptile and mammal to man, thus illustrating the Darwinian theory of organic evolution and showing that cancer is not solely a product of civilisation, but probably existed at a very early geological epoch in our history. In passing it is important to point out that the herbivora, carnivora, and omnivora are all liable to cancer.

When our knowledge of the disorders of plant life becomes more extensive it is possible that conditions analogous to cancer may be discovered in the vegetable kingdom; some scientists believe that the widespread condition known as "crown-galls" is of this nature, whilst others fail to see the analogy; the similarity of the structure of the vegetable cell to that of the animal, should, however, make us keep our minds open on the subject.

Clinical Features of Cancer.

The clinical features of cancer in man are distinctive and strikingly unlike those of the inflammatory disorders of infective origin, for it is neither contagious nor infectious in the ordinary sense of the terms, nor does it show seasonal prevalence. If, as has been asserted, it is endemic in some localities it never spreads in the manner of epidemics. The physically strong are subject to cancer as well as those who are physically weak; and it attacks the old rather than the young, being most frequent in the decline of life. It is common to both sexes, but predominates in the female, and though it may arise in almost any part of the body it shows a predilection for the alimentary tract in man and the reproductive system in women. We do not associate the malady with any particular type of individual, nor do we speak of a cancerous diathesis, though it probably exists, since cancer may run in families, thus showing an hereditary tendency. Its onset is insidious, and unattended by constitutional disturbance, there being no definite incubation period nor premonitory symptoms; but once started it runs an indefinite and generally prolonged course, and, in the absence of complications, usually without fever. Accompanied by wasting it progresses towards a fatal termination with little tendency towards recovery.

Conditions under which Cancer Arises.

If we inquire into the circumstances under which cancer arises in man we find it is closely associated with the process of inflammation, which is the tissue response to injury. Thus it develops in damaged tissues—tissues that have been subjected to some form of injury, be it physical or chemical. It may follow a severe injury, such as a blow or contusion, usually appearing after a considerable interval; or a mild injury produced by the action of pitch, petroleum, soot, heat or the X rays, and other forms of chronic irritation. The disorder follows the chronic inflammatory reactions provoked by these irritants. On other occasions we see cancer arise in the course of some chronic infective process of a septic, syphilitic, or tuberculous nature, or, again, in association with rheumatism or gout. All these processes are characterised by local chronic inflammations, which are the reactions of the damaged tissues; as instances I may mention the supervention of cancer in old ulcers, syphilitic glossitis, lupus, psoriasis, and so forth. All pathologists recognise that cancer may develop in organs that are the seat of chronic inflammation, such as the liver, in which case it is often multiple, or the kidney.

Inflammation and Cancer.

It is manifest, therefore, that there is a very close connexion between inflammation and cancer, and the fact that the disorder is liable to follow chronic inflammation shows that its early stages develop, and must be sought for, in the late or chronic stages of inflammation. If we trace step by step the changes in the tissues that lead up to its development we should be able to discover its origin. With this end in view I will briefly describe the essential tissue changes of chronic inflammation and afterwards those associated with the development of cancer, stating what I consider to be the connexion between the two.

Chronic inflammation may be the sequel of acute inflammation, but is more often insidious from its commencement, like the fatal malady which is liable to follow it; it is generally local and unattended by constitutional disturbance; giving rise in its early stages to few symptoms, its presence is often unsuspected and therefore overlooked, and may only be revealed by the microscope.

There is no region of the anatomy wherein we may study the tissue changes of chronic inflammation to greater advantage than in the female breast, for this organ is peculiarly exposed to external and internal conditions which damage its tissues; moreover, since cancer of the breast is so common we can observe the relationship of inflammation to cancer in the same organ.

Before entering upon a consideration of these two pathological conditions as we here meet them it might be advisable briefly to recall the structure of the healthy organ, which varies considerably according to age and physiological conditions.

In the nulliparous adult female it is composed of 15 to 20 small glands, racemose in type, built on the model of the sweat gland; these glands, whose ducts open on to the nipple, are embedded in a loose fatty connective tissue, in which ramify the blood-vessels, lymphatics, and nerves. Each gland is composed of a number of lobules, formed by the branching of their ducts, which end in tubulo-saccular alveoli. On section under the microscope the lobules appear as groups of round or oval acini, lined by a single layer of polyhedral

epithelium placed on a homogeneous basement membrane, outside which is a layer of stellate connective tissue cells. Between the acini is a fine connective tissue of fibroglia fibrils, amongst which are scattered a few connective tissue corpuscles; in this tissue is a network of capillaries and a plexus of lymph sinuses, which is in intimate contact with the outer walls of the acini.

Tissue Changes in Chronic Inflammation of the Breast.

Chronic inflammation in the breast does not differ materially from chronic inflammation in other parts of the body. It may affect only one organ or both, and it may be diffuse, affecting the entire gland, or localised in one part of it. If the inflammation is mild or of relatively short duration it is associated with hypertrophic changes resulting in proliferation and increase of the tissue elements; if severe or prolonged, it is associated with destructive changes, resulting in decrease of the tissue elements.

When the hypertrophic changes occur in the connective tissue we observe there is new formation of fibroblasts, fibrils, and plasma cells, which replace the fatty tissue of the organ. When the glandular tissue proper is involved we observe new formation of glandular epithelium, the newly formed elements squeezing themselves in between the older. As a result the gland tube either extends in length, when the lobules will be seen to cover a larger area and on section their acini will appear more numerous, or the tube expands in width, appearing dilated or cystic. When the tube ceases to expand a portion of its wall may invaginate and subsequently the invaginated portion may become convoluted; thus arises a tumour projecting into and occupying the centre of the dilated tube, presenting the appearance under the microscope of a papillomatous growth inside a cyst. Another alternative is that the newly formed epithelium may displace the older elements towards the centre of the tube, and its epithelial lining then becomes two or more layers deep, narrowing its lumen and sometimes obliterating it, thus converting the tube into a cylinder. The destructive changes of chronic inflammation affect the more highly organised epithelial cells before the less highly organised connective-tissue elements; if they are severe, the epithelial cells may be totally destroyed, necrosis following, and the cell dying en masse. If the destructive process is less severe the epithelial cell may be only damaged from partial destruction of its structure; it continues to live, but shows degenerative changes. In those cases in which there has been new formation of connective tissue the newly formed tissue contracts, resulting in scarring or fibrosis of the organ, thus diminishing the blood-supply to the glandular tissue; the epithelium then shows atrophic changes. Chronic inflammation may be at one time active and at another passive, waxing and waning according to condition of the individual's health; its active stages are marked by the infiltration of the perivascular tissues with lymphocytes.

Such, briefly, are the essential tissue changes which may result from chronic inflammation in the breast.

Tissue Changes in Cancer of the Breast.

When we are fortunate in witnessing the dawn of cancer in the breast we shall observe it appear in the course of chronic inflammation; moreover, we shall notice that it arises not in the earlier proliferative stage but in the later or destructive stage of that process. So closely does the malignant process follow on the inflammatory, and so much difficulty do we experience in deciding where the inflammation ends and the cancer begins, that we are driven to suspect that they are phases of one and the same process.

(1) *Acute mammary cancer.*—The onset of cancer in the breast is usually insidious, but it may be relatively acute, in which case it disseminates early and runs a comparatively rapid course. These terrible cases are fortunately rare, but it is in such cases that we can most readily trace, pathologically, the development of cancer, since the process is generally diffuse, affecting the entire organ; and gland lobules can be studied simultaneously in every stage of transition from that of simple chronic inflammation to that of complete malignant transformation (Fig. 1). The pathological changes to be observed in such cases may for the sake of convenience be considered under two categories: firstly, those that are old and more or less passive; secondly, those that are recent and more or less active. The older changes are of long standing and the result of chronic inflammation; they are hypertrophic in character as shown by the increase in the quantity of connective tissue and in the size of the gland lobules (Figs. 2 and 3.)

The more recent changes are also the result of the chronic inflammatory process, which is now in an active stage, as shown by the infiltration of the perivascular tissues with lymphocytes. Associated with this activity of the inflammatory process are to be noted destructive changes in the epithelium of the gland tubes. In those lobules where the inflammation is most severe the epithelium is destroyed, as shown by its necrotic condition; this destruction may be confined to only a few cells lining an acinus, or it may extend to all; usually only a few of the acini of a lobule suffer in this manner, but occasionally we can observe a lobule which has been thus practically obliterated (Fig. 4). As a result of this widespread destruction there is a great reduction in the number of epithelial cells.

Where the inflammatory process is less active we observe that the epithelium, though not destroyed, is nevertheless damaged, as shown by the alteration in its appearance; the protoplasm and the nucleus of the cell swell and become less dense in consistency, and consequently, when stained, appear paler than in the normal healthy cell; as a rule, these damaged cells are thrown off into the centre of the tubule. Those epithelial cells of the tubules which at this stage have escaped destruction or damage at a later stage are observed to undergo atrophy (Fig. 6), and are subsequently destroyed by the growing cancer cells; *the only epithelial elements which ultimately survive are those which have been damaged.* When the inflammatory process subsides, as indicated by the disappearance of the lymphocytes from the surrounding tissues, further changes are seen to take place in these damaged cells; they increase in size and gradually assume the aspects of a cell of a lower type, resembling in some respects embryonic cells, an appearance which lent colour to the long since refuted theory of embryonic reversion as a cause of cancer (Fig. 5). Mitoses now appear in these degraded cells, and they commence to divide, showing malignant characteristics by continuous proliferation and invasion of the adjacent lymph-sinuses, from whence they enter the lymphatic vessels of the connective tissues, which they permeate in the manner described by Handley[2] (Fig. 6).

We thus see that cancer arises in the later or destructive stages of chronic inflammation, not in the earlier proliferative stage; moreover, it is preceded by the degeneration of the cell. We have thus tracked cancer to its source; it springs from a degenerate cell, a cell that in some manner has been damaged or injured, and from such a cell all cancer cells are descended. In this light cancer appears as a terminal phase of inflammation and as a form of degeneration, in which sense indeed it was regarded by the older school.

2. *Chronic cancer.*—As a rule cancer of the breast is more insidious in its onset than in the cases I have described; it disseminates more slowly and runs a more or less prolonged course. Since it is not generally recognised until it has developed into a palpable tumour we are not often afforded the opportunity of studying the development of the growth, for it destroys the tissues in which it arises and with it the only direct evidence of its origin; nevertheless owing to its multicentric character we are often able to observe gland lobules in the neighbouring breast tissue in various stages of transition from that of chronic inflammation to that of complete malignant transformation; with this circumstantial evidence we are justified in assuming that the tumour itself had passed through stages similar in development. The essential pathological changes in the tissues of these chronic cases is the same as in the more acute cases, but they are slower and more insidious in their development, as a consequence the changes in the gland cells are not so obvious. This is especially the case in those instances in which the malignant change in the cell exists without any marked alteration in its morphology. The process begins with inflammation and ends in malignant degeneration. This change in the epithelium follows, and, in my opinion, is the result of the destructive action of the inflammatory process which damages the cells. What the extent or exact nature of that damage is in any particular case in the present state of our knowledge we are not in a position to say, but we know that inflammation impairs

For descriptions of Illustrations see p. 699.

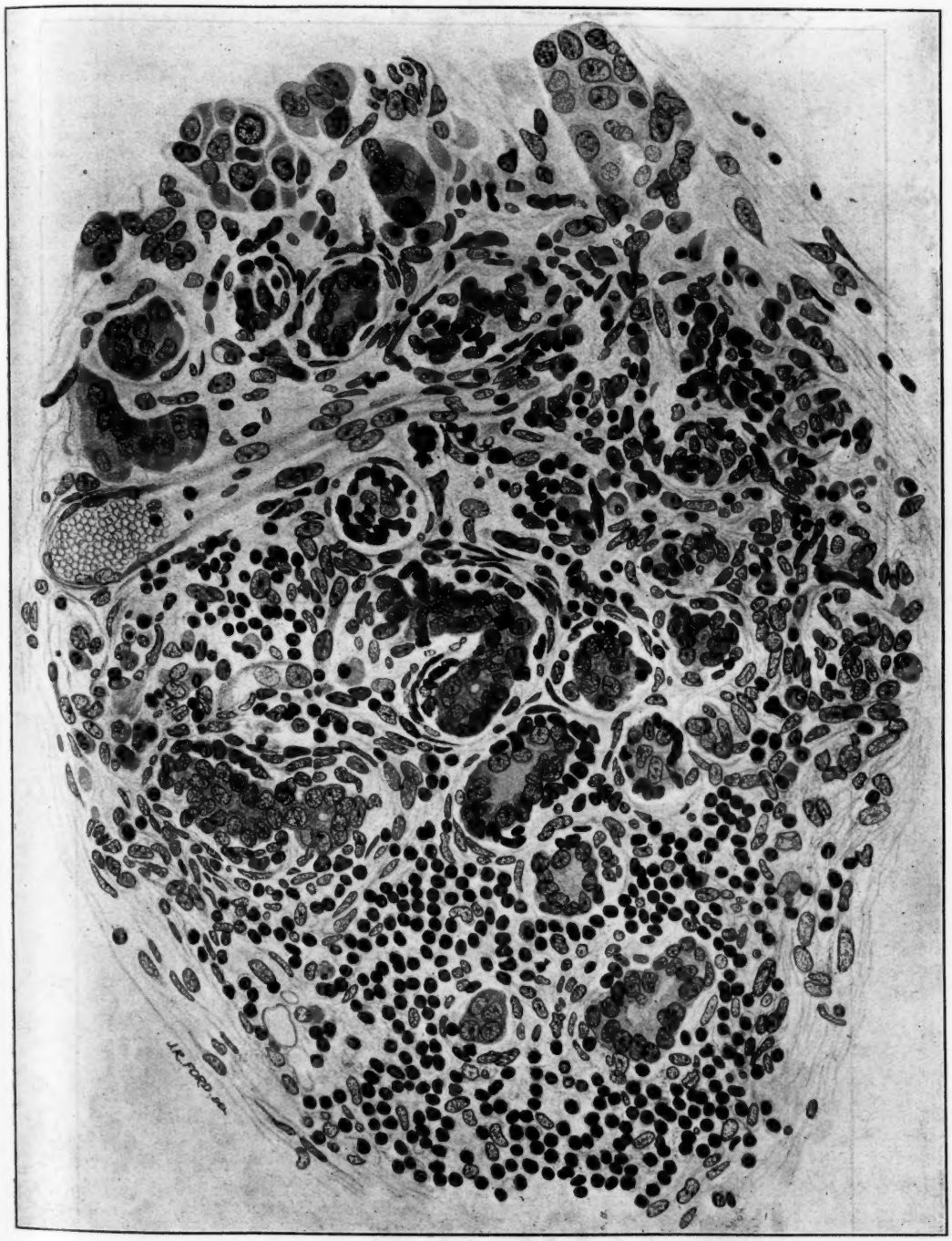
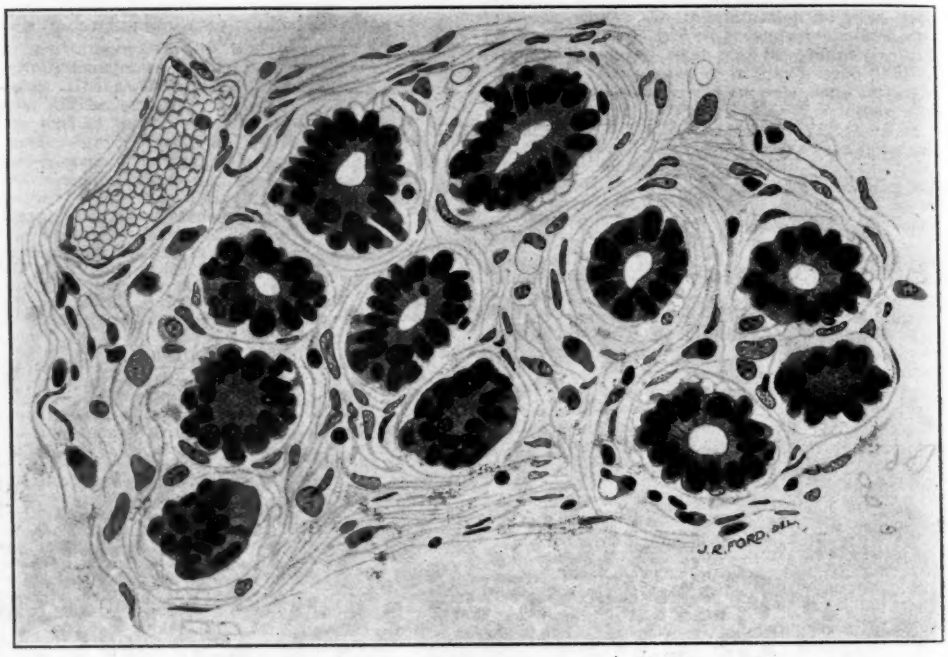


FIG. 1.

For descriptions of Illustrations see p. 699.

FIG. 2.



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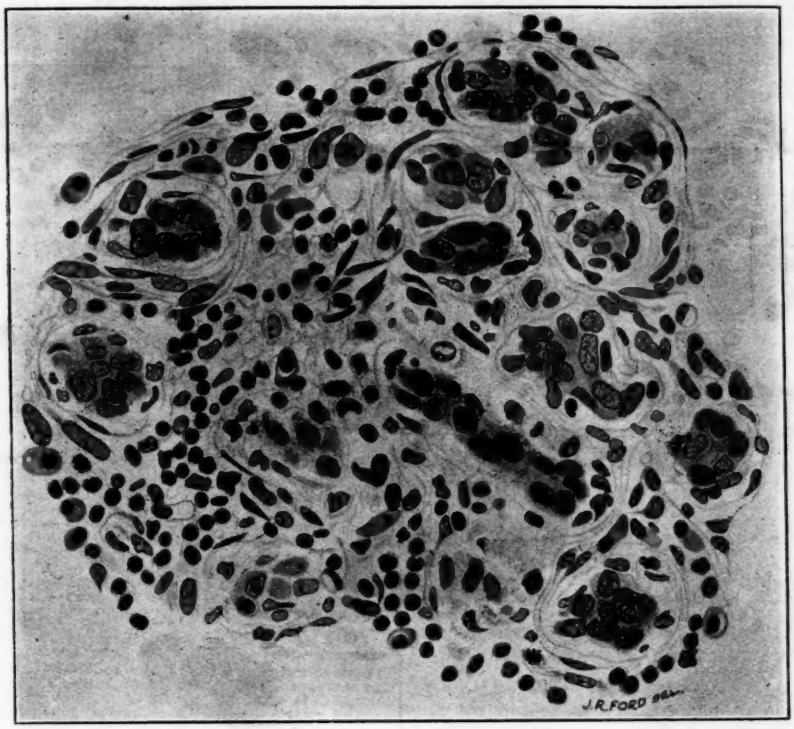

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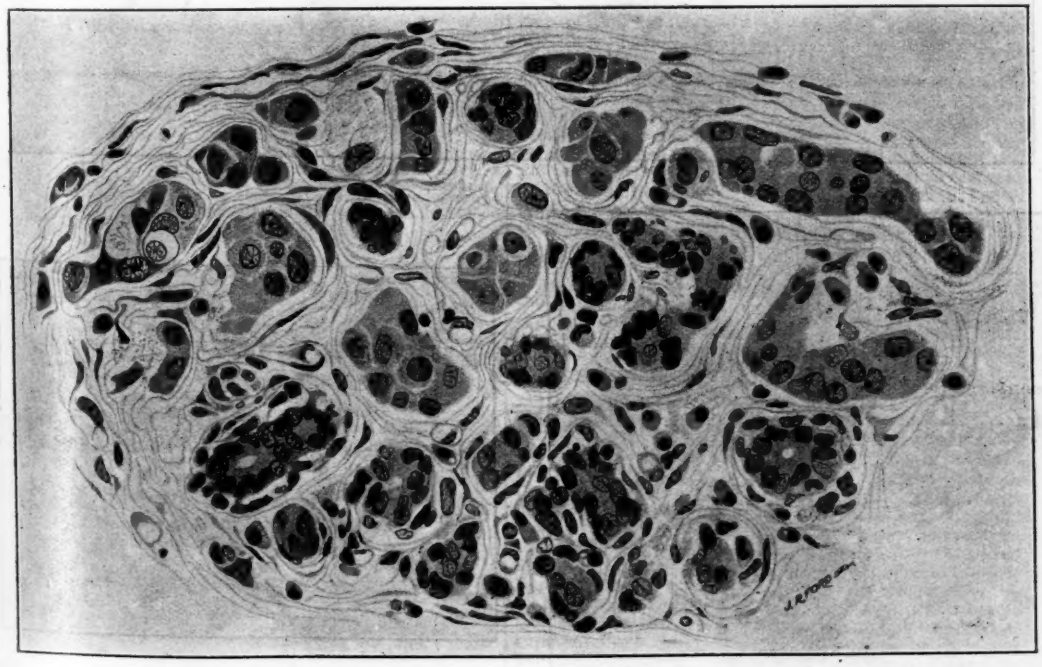

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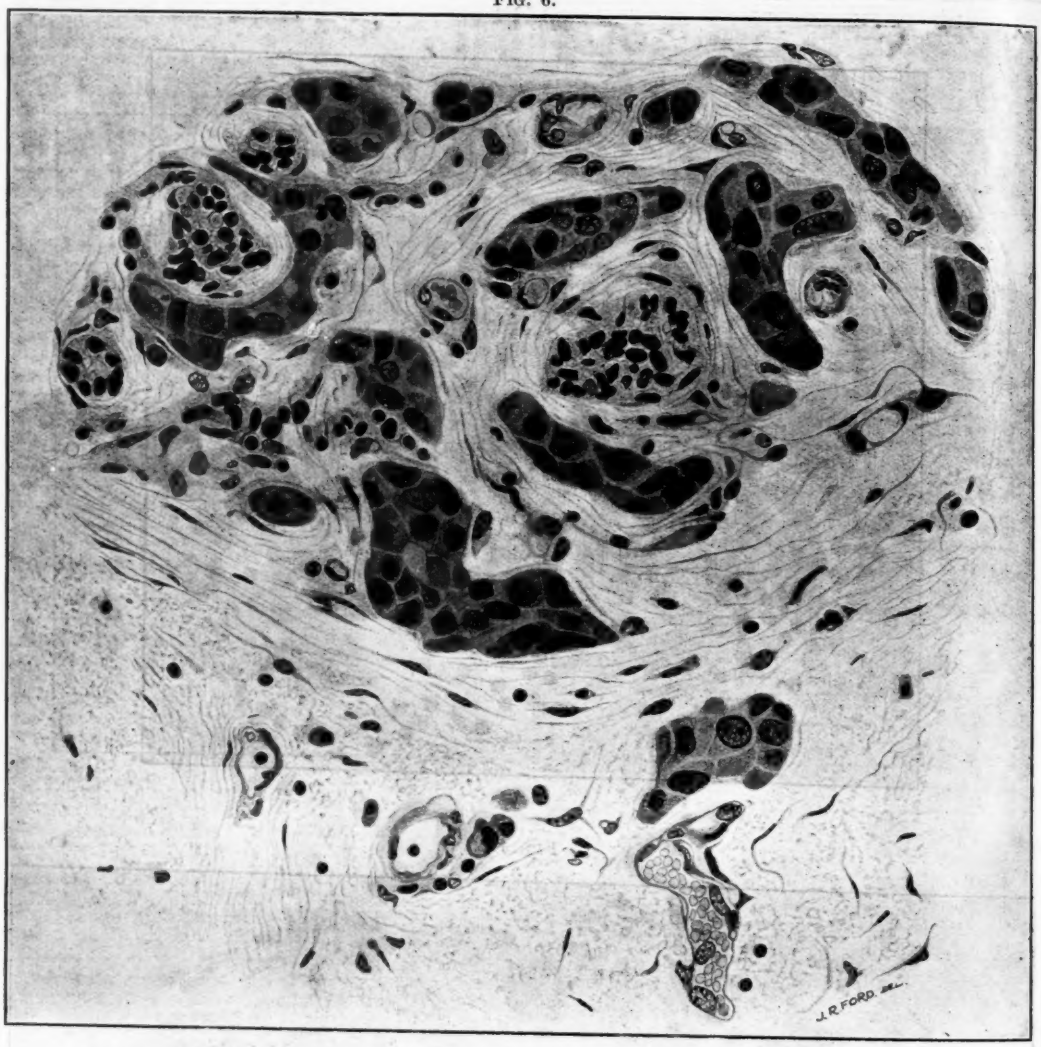

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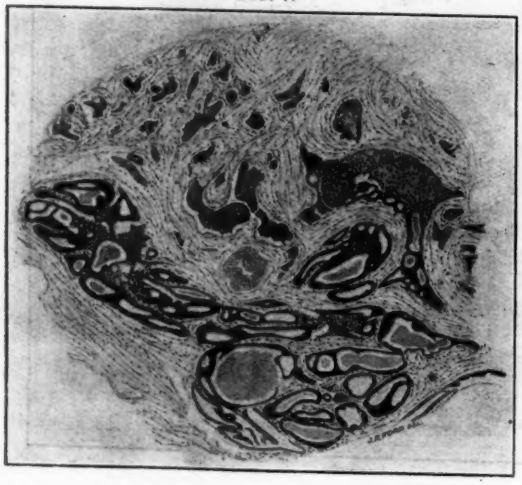

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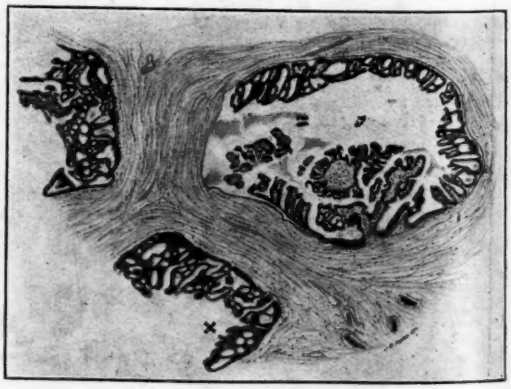

the function of the cell, and also that in cancer the cell's function is impaired. Are we not therefore fully justified in attributing the damage of the cell to the inflammatory process? Until we know more of the structure and physiology of the cell all that we can say is that its nobler structure, that part of the cell's mechanism which regulates its function, has been impaired. Now, if that portion of the cell's mechanism which regulates its function, the most highly specialised and therefore, we may suppose, the first to suffer, was damaged, it would follow that the food assimilated by the cell which is normally expended in performing its function would not be all used up for this special purpose; the surplus would accumulate in the cell. Thus the cell would be in the position of a young cell which, as Spencer[3] expresses it, "daily absorbs under the form of food an amount of force greater than it daily expends and the surplus is daily equilibrated by growth." In this connexion it is interesting to recall that Oertel[4] has advanced a theory which supposes that there may be two parts of the nucleus of a cell, one which regulates its function and the other its growth. Whether this explanation of the persistent growth of the cancer cell is correct or not we must admit that a profound change, physiological, bio-chemical, or call it what we may, has taken place in the cell. The metabolism of the cell has been disturbed, and this change follows and is consequent on the damage of its structure, which, as I have already stated, I consider attributable to the destructive action of inflammation, or rather the injury which provokes it. The cell is altered both morphologically and physiologically, and in this sense only, in my opinion, is the cancer cell a different or new cell. I hold the view that cancer originates in an alteration of the metabolism of the epithelial cell itself, and not in any alteration of tissue tension arising from inflammatory changes in the surrounding connective tissue whereby the equilibrium between the epithelium and connective tissue is disturbed, as implied by the theories of Thiersch and others. Moreover, I do not consider that the vegetative growth of the cell in cancer can be attributed to its having gained the "habit of growth" whereby it loses its habit of function, as is maintained by Adami[5]; I hold that it is due to the impairment of the specialised function of the cell consequent on damage of its structure; this I regard as the primary change to which the vegetative growth of the cell is secondary.

DESCRIPTIONS OF ILLUSTRATIONS.

FIG. 1 is a microscopic section of a gland lobule in acute mammary cancer.

The figure shows the tissue changes in the development of cancer described in the text. Zeiss, Obj. 8 mm. apoc. Oc. 12. The right half of the lobule shows active inflammation and degenerative changes in epithelium of the tubules. The left half, in which the inflammation has subsided, shows the subsequent malignant degeneration of the epithelial cells with consequent alteration in type.

FIGS. 2, 3, 4, 5, and 6 illustrate the successive stages in the development of cancer in the lobule of the human mammary gland. These drawings were traced from the same microscopic section of a case of acute mammary cancer following chronic inflammation of the organ. Iron hæmotoxylin. Zeiss, Obj. 8 mm. apoc. Oc. 12.

FIG. 2.—Normal mammary lobule, showing slight hypertrophic changes the result of chronic inflammation.

FIG. 3.—Mammary lobule showing degenerative changes in the epithelium of the gland tubules following the action of prolonged chronic inflammation. The epithelial cells are to be seen in various stages of degeneration, and it will also be observed they do not stain so deeply as a consequence. Note the plasma-cell formation in the stroma.

FIG. 4.—Mammary lobule showing the destructive and damaging effects of severe inflammation on the epithelium of the gland tubules. In some tubules the epithelium is destroyed and is seen to be necrotic. Where the epithelium is simply damaged it shows degenerative changes. It will be observed the gland cells have lost their tubular arrangement and thus the lobule is disorganised. Note the lymphocytic infiltration of the stroma.

FIG. 5.—Mammary lobule showing the changes which take place in the epithelium of the gland tubules when the inflammation has subsided. The epithelium shows every gradation of malignant degeneration, the cells increasing in size and altering in type. Note the disappearance of the lymphocytes from the stroma.

FIG. 6.—Mammary lobule in the final stage of malignant degeneration. At the junction of the lobule with its duct the newly formed cancer cells are commencing to divide and invade the perivascular lymphatics of the neighbouring tissue. The tubules which have not undergone malignant degeneration are seen to be atrophic. Note the commencing vascularisation of the newly formed cancer tissue.

FIGS. 7, 8, 9 are microscopic sections of the human mammary gland.

FIG. 7.—Microscopic section of the mammary gland (human), showing the development of cancer from an innocent growth. Zeiss, Obj. 16 mm. apoc. Oc. 8. The breast tissue shows chronic inflammatory changes with cystic adenomatous degeneration of the gland tubules. The epithelium of the tubules is seen in parts to have undergone malignant degeneration resulting in the development of a scirrhus carcinoma.

FIG. 8.—Microscopic section taken from the same breast as Fig. 7 showing chronic inflammatory changes with formation of intracystic papillomatous growths. Zeiss, Obj. 16 mm. apoc. Oc. 8. In one area (marked x) the epithelium of the growth has undergone malignant degeneration.

FIG. 9.

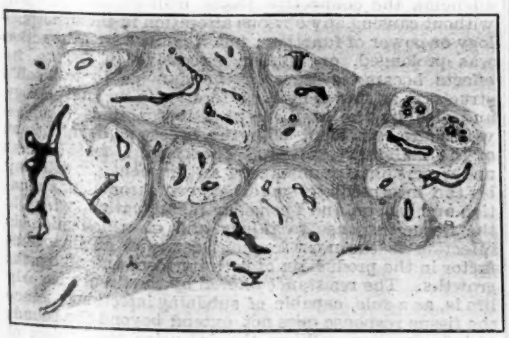

FIG. 9.—Microscopic section taken from the same breast as Fig. 7, showing fibro-adenomatous degeneration of the breast tissue. Zeiss, Obj. 16 mm. apoc. Oc. 3.

Comparative Pathology of Breast Cancer.

If we appeal to comparative pathology we shall receive corroborative evidence of that relationship of inflammation to cancer which I have described in man. I have studied mammary cancer in the dog, cat, and mouse, in whom the disorder is not uncommon. Cancer of the breast is very common in the domesticated mouse, as is chronic inflammation; owing to the simple structure of this animal's tissues the pathological changes are more easily followed than in the more highly complex tissues of the higher animals. The tissue changes of chronic inflammation in the breasts of mice are analogous to those I have already described in the human female, so I need not reiterate them. Cancer of the breast in mice generally arises in one part of the organ, but there may be multiple growths, showing the multicentric origin of the disorder. The clinical features of the condition are much the same as in man, but it tends to remain localised. The histological picture of these growths is identical with that presented by the chronic forms of cancer in the human female. The type of growth is usually of the soft medullary variety, or, as it is otherwise called, encephaloid or alveolar, but the glandular forms are also common; pathologically the disorder, as in man, begins in chronic inflammation and ends in malignant degeneration.

Micro-organisms and Inflammation of the Breast.

Thus we see that in man and the lower animals inflammation is a precancerous condition. Bonney[6] drew attention to the fact that the inflammatory changes which precede the onset of cancer in man are not specific, and differ in no way from those seen in the chronic stages of septic, syphilitic, or tuberculous inflammations (and to these I would add the widely spread rheumatic). We must not forget that the most frequent cause of inflammation is microbic infection. The micro-organisms usually associated with inflammation of the breast in women are various members of the staphylococcal and streptococcal groups; the tubercle bacillus is sometimes found to infect the breast, but tubercuious inflammation of this organ is rare and generally occurs in young women below the cancer age.

Mice also are very prone to microbic infection when kept in confinement. Mr. Clarke, of Acklington, who breeds fancy mice, has kindly supplied me with a number of these animals which had developed lumps in their breasts; in the younger animals these invariably proved to be inflammatory (abscesses), but in the older animals veritable cancers.

I have excised portions of the breast tissue of these animals suffering from both chronic inflammation and cancer of the breast, under aseptic precautions, and, on incubating the tissues in peptone-bouillon, obtained cultures of staphylococci and streptococci. In 20 cases of spontaneous cancer in mice micrococci were found in the breast of 15, and in 8 of these they were present also in the growth; in 9 instances the organisms were staphylococci and in 6 streptococci. I have found also by experiment that those organisms were pathogenic and capable of producing chronic inflammatory reactions.

In chronic inflammation of the breast the organisms are of low virulence; consequently they provoke a low form of inflammation, and since they are capable of living in the tissues for long periods slowly excreting their toxins, the inflammatory reaction they provoke is chronic.

The first results of the irritant action of the toxins on the tissues will be one of stimulation causing their proliferation, but if the action is prolonged or increased in intensity it destroys or damages the tissue cells, leading to their necrosis or degeneration, the highly specialised epithelial elements being the first to suffer. It is in this manner I consider that the degeneration of the epithelial cell which precedes the malignant change arises.

Influence of Age and Heredity on the Incidence of Cancer.

We must admit, however, since inflammation does not always terminate in cancer there must be other factors which predispose to the malignant change. It is in later life that inflammation is so prone to be followed by cancer; therefore age must modify the inflammatory process in a manner that favours its development. Age, as we know, is a powerful predisposing factor in cancer, and as such stands out in bold relief. When we consider that our tissues are constantly undergoing both morphological and physiological modifications as we proceed from infancy to old age, we must also expect their inflammatory reactions to be correspondingly modified. When we are young we resist and recover from injury more quickly than in later life; for these reasons our inflammatory reactions are generally acute and of short duration, and any damage the tissues receive, short of destruction, is repaired by our growing tissues. When we reach maturity and enter upon the decline of life we neither resist nor recover so rapidly from injuries; hence our inflammatory reactions are more prolonged and chronic, and any damage the tissues suffer tends to remain permanent owing to the gradual loss of the power of regeneration. This, I think, is the reason why cancer is so prevalent in the later half of life, when we experience difficulty in overcoming injuries. Bashford[7] laid great stress on senescence as a cause of cancer, and aptly reminds us that the span of life of the individual is not the same as that of the separate organs and tissues which contribute to its maintenance; he cites instances from human pathology to illustrate the fact. In his own words:—

> "The chorion has a short life and chorion-epithelioma appears after fertilisation at an interval which corresponds to the senile stage of proliferation. The mamma and uterus attain maturity more slowly and are active for a relatively longer time; but carcinoma has its incidence when the organs are undergoing involution. The skin remains functional long after middle life and the age of greatest frequency of squamous-cell carcinoma corresponds."

Senility of tissue is purely relative, and we must not forget that age may be premature. Hutchinson[8] stated his belief that "everything which tends to hasten senility of tissues, whether local, such as injury or chronic irritation, or general, such as anxiety, distress, overwork, and excesses of all kinds, induces a state involving increased proneness to cancer," and, moreover, "if the offspring are produced after that state has developed they will inherit that tendency." When we consider that heredity, as defined by Thomson,[9] is "the relation of organic continuity between successive generations, each parent contributing the same amount of nuclear material to the offspring," and "that abnormal as well as normal characters natural to the parent may appear in their descendants," we must admit that heredity is a factor we cannot afford to ignore in the development of cancer; it is recognised that the disorder may run in families, but we have no reliable statistics showing the extent to which it is hereditary. In 100 consecutive cases of cancer of the breast in hospital patients I obtained a definite family history of cancer in 18, and in these cases I was able to confirm the experience of Paget,[10] who found that the malady appeared at an earlier age in the offspring when the inheritance was direct.

Animals show similar tendencies. I am informed that the breeders of fancy mice are in the habit of destroying a particular strain that shows a tendency to develop tumour-growths. This hereditary tendency has been studied experimentally in these animals by Murray[11] and Slye,[12] who showed by careful breeding experiments that the offspring of mice with a cancerous ancestry were more prone to develop cancer than those without such an ancestry; the latter investigator also observed that mice with a cancerous ancestry readily developed cancer as a result of injury, whereas control animals showed no such tendency.

Relationship of Innocent to Malignant Growths of the Breast.

Any consideration of the origin of malignant growths must also involve a consideration of the origin of innocent growths, for not only may these two conditions develop independently side by side in the same organ, but an innocent growth may develop into a malignant growth. The intimate relationship of the innocent to the malignant growth was shown in a case that recently came under my observation of a young woman whose right breast was removed for carcinoma. On microscopic examination the organ was found to be the seat of chronic inflammation (chronic mastitis); in one part of the breast the gland tissue was undergoing cystic-adenomatous changes (Fig. 7), in another an intracystic-papillomatous change (Fig. 8), and in a third a fibro-adenomatous change (Fig. 9). From the cystic-adenomatous tissue could be observed the development of a scirrhus-carcinoma, whilst the epithelium of the papilloma was also undergoing malignant degeneration. Who can doubt that all of these four different types of growth, both innocent and malignant, having the same inflammatory basis of origin, arose under the influence of the same stimulus? What other interpretation can be placed upon their origin? It appears to me that in the case of the innocent growths the irritant that provoked the inflammation which preceded their development was of such a low degree of virulence that it only stimulated the cells to proliferate (and in the case of the fibro-adenoma the connective tissue cells are also affected) without causing any obvious alteration in their morphology or power of function; but when the irritant action was prolonged, or became excessive in degree, its effects became evident in the damage to the cell's structure, as shown by the alteration in its morphology and also by the impairment of its functions—changes which are coincident with the onset and development of the malignant growth. Therefore, I consider that under certain circumstances an innocent growth may be the intermediate stage between chronic inflammation and cancer, and I consider inflammation, which is the tissue response to injury and of which microbic infection is the most frequent cause, as an important factor in the production of both innocent and malignant growths. The resistance offered by the tissues in early life is, as a rule, capable of subduing infections; hence the tissue response does not extend beyond the bounds of inflammation. When the defensive mechanism of the body fails from lowered vitality, especially in middle and late life, then the tissue response extends beyond the limits of inflammation, resulting in the formation of

innocent and malignant growths. I therefore regard new growths as the expression of failure on the part of the organism to repair its damaged tissues.

What bearing this hypothesis of the development of growths may have on tumour-formation in general must be left to the future, but I am inclined to think that the disturbance of the metabolism of a cell, whether animal or vegetable, is an underlying cause of various forms of tissue growths, both innocent and malignant.

Conclusions.

In my opinion cancer is not a specific disease due to the activities of a special parasite, but a disordered growth of epithelium caused by various physical or chemical irritants, the most important being the toxins of micro-organisms. I consider that the origin of cancer lies in the degeneration of the nobler parts of the cell consequent on damage of its structure. The result of this damage is to disturb the balance of metabolism by impairing the special functions of the cell, and thereby causing persistent overgrowth.

I desire to thank the authorities of the Cancer Hospital who have afforded me the opportunity of carrying out my researches in their institution. During the progress of this inquiry, which has extended over many years, the advice and criticisms of my friend and colleague, Dr. F. J. Poynton, have been most helpful. I would also acknowledge the services rendered me by Messrs. J. Marsh, W. Davis, and G. Napier, who have assisted in the various fields of inquiry covered by this extensive subject.

For the accurate microscopic drawings illustrating the early tissue changes associated with the development of cancer I am indebted to the skill of Mr. John Ford.

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A NOTE ON THE

EXOPHTHALMOS AND LIMITATION OF THE EYE MOVEMENTS OF GRAVES'S DISEASE.

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THERE is lack of uniformity of opinion as to the immediate cause of the prominence of the eyes in Graves's disease. It has been variously attributed to three entirely different causes: (1) Irritation of the sympathetic nerve producing contraction of unstriped muscle tissue in the orbit; (2) engorgement of the orbit with blood; and (3) increase of the orbital fat. With regard to the first two of these, they would seem to have powerful support from the statement, if true, that the proptosis of Graves's disease disappears after death.

Death from this disease is of rare occurrence in a general hospital, and I have but once had an opportunity of making a post-mortem dissection of the orbit in such a case; this was in a woman of 45. It can certainly be said of this patient, whom I had seen during life, that after death the exophthalmos was marked, and was only so much less than during life as might be accounted for by the draining of blood from the orbit after death, corresponding with the recession of the eye that one sees normally in the post-mortem room. It is clear that in this particular case neither sympathetic irritation nor blood engorgement was the cause of the proptosis. It is difficult to identify what is an excess of fat in a cavity which is normally full of it. In this case, however, the orbit was certainly full to overflowing with it, and nothing else abnormal was present; the proptosis was clearly due to the excess of fat. Mr. C. B. Goulden tells me that he has recently operated on a woman of 68 for cataract in whom exophthalmos was marked. At the age of 19 she had been under the care of Sir Jonathan Hutchinson for Graves's disease. Thus in her the exophthalmos had persisted for 49 years after the onset of the disease.

It is well known that the prominence of the eyes may be so extreme that it is no longer possible for the lids to close over them, and the danger of severe corneal ulceration with complete loss of the eye is then considerable. Jessop[1] reports three such cases, and tabulates 25 in which there was complete loss of sight from corneal lesions.

Operative Treatment.

I have recently had under treatment a woman of 53 who had Graves's disease with severe exophthalmos. This ultimately became so extreme that it was impossible, even under general anæsthesia, to force the lids together over the right cornea, which had a dry and parchment-like appearance from exposure; the left eye was less prominent. Some procedure was imperative if the right eye was to be saved; I therefore made an incision through the whole length of the inferior conjunctival fornix, exposed the contents of the orbit, and with forceps picked away piecemeal as much orbital fat as possible. I estimate that a heaped-up teaspoonful was thus removed. Afterwards the lids were easily approximated, and were in part sewn together over the cornea, as also were the left lids, and by this means both eyes were preserved. With one finger the orbital cavity was explored, and nothing but soft fat was felt. In addition, however, the fat seemed œdematous, and in particular the inferior, internal, and external recti muscles were exposed for a considerable distance, and these, instead of being thin, flat, ribbon-like muscles, such as one becomes familiar with in squint operations, were greatly swollen fusiform bellies apparently from œdematous infiltration, not quite so stout as the last joint of one's little finger.

Theories of Causation.

In this case, as in the former, the prominence of the eye was certainly due to increase in the orbital fat, with perhaps in addition some œdema of the tissues. It is argued, apparently with much force, that in some cases at least the proptosis must be due to some cause such as contraction of unstriped muscle, since it may develop very rapidly. Thus Sir Archibald Garrod has pointed out to me that W. Falta[2] states that exophthalmos may be developed in a few days or even in a single night, and that it is then probably due to the contraction of the unstriped muscle tissue in the orbit through sympathetic irritation. If such an occurrence is demonstrable, it is evident that the proptosis is not due to the deposit of orbital fat; it strikes one, however, as remarkable that two so entirely different factors should be responsible for the same sign in a single disease, and, further, the anatomical proof of the existence of the requisite muscle tissue seems to be entirely wanting.

One certainly has to be on guard against being deceived by a sudden development of retraction of the upper lid simulating proptosis, or unmasking a proptosis which up to then had gone unnoticed; the patient's observations are, of course, not to be relied upon on such a point. It seems to me undeniable that increase of orbital fat is the usual cause of the exophthalmos of Graves's disease, and that at present there is no really satisfactory evidence that there is any other cause of it. With regard to the limitation of movement of the eyes which occurs not uncommonly, I have recently seen a patient of Sir Thomas Horder's who stated that her eyes became prominent within a week and in whom there was considerable limitation of movements in all directions. The impaired movements were clearly not referable to nerve or muscle defect. Such limitation of movement is, I believe, mechanically produced by the pushing forward of the eye, and I suggest that the œdema of the muscles described above is a factor in impairing their functions and so contributes to the restricted movement of the eyes which not uncommonly occurs in this disease.

[1] Trans. Ophth. Soc., vol. xvi., p. 187.
[2] Die Erkrankungen der Blutdrüsen, p. 50, Berlin, 1913.

Medical Societies.

OCIETY OF MEDICAL OFFICERS OF HEALTH: NAVAL, MILITARY, AND AIR FORCE HYGIENE GROUP.

THE first meeting of the new Group was held at the house of the society, 1, Upper Montague-street, London, on Sept. 24th, 40 officers and ex-officers being present.

Sir JOHN GOODWIN, who provisionally occupied the chair, wished the group a future full of usefulness and success, and emphasised the great benefits which its existence would create by developing and increasing the liaison between officers of the Regular and Territorial Forces and civil medical officers, all of whose duties were directed towards the improvement of public health.

After the election of Professor H. R. KENWOOD as President of the group he invited the Director-General to do honour to the group by remaining in the chair throughout the meeting.

A letter was read from Lieutenant-Colonel F. E. Fremantle, M.P., President-elect of the society, in which he said that many who had served abroad would be glad to revive an interchange of experience. The system and spirit, he added, learnt in the army, by which a man had to prove the practical value not only of his actions but of his actual advice, was of immense value to his work in civil life.

Professor KENWOOD referred to his long connexion with the Army Medical Department, and spoke of the great value which must in the future arise as a result of the discussion of subjects affecting the common conditions of health in the Services and in civil life.

Brigadier-General W. W. O. BEVERIDGE then gave the review of Disinfection and Disinfestation in the Field, which appears in full at the front of our present issue. The lecture was illustrated throughout by excellent photographs on lantern slides, diagrams, and models lent by Lieutenant-Colonel P. S. Lelean, Professor of Hygiene at the Royal Army Medical College.

Lieutenant-Colonel J. S. WARRACK, Port of London Sanitary Authority, referring to the extremely efficient manner in which enormous numbers of soldiers, prior to their return to Britain after the armistice, were disinfested at the different French ports, made the statement that on only three of many transports arriving at the Thames were louse-infested men discovered.—Captain C. B. MOSS-BLUNDELL, C.M.O., Huntingdon, made reference to the use of pentasulphide of calcium as an efficient cure of scabies.—General BEVERIDGE, in reply, agreed that the chemical was invaluable, but under service conditions its use was not by any means a practical proposition. Chemicals are bulky and heavy, and make a great demand on the transport services, and for these reasons could not be considered.

The PRESIDENT raised the point, in speaking of a new form of portable steam disinfector designed by Colonel Lelean, as to whether there was penetration into the centre of tightly packed kits.—Colonel LELEAN assured the meeting that cultures of Shiga's bacillus or Klebs-Löffler's bacillus placed in the centre of the kits were sterilised after the passage of steam. The malic acid test was also used with success. A temperature of 102°C. was recorded by means of the thermo-electric couple.

Election of Officers.

The following office-bearers were elected:—

Vice-Presidents: Major-General Sir W. G. Macpherson, Brigadier-General Sir Wm. Horrocks, Colonel Sir G. Sims Woodhead, Brigadier-General W. W. O. Beveridge, Air-Commodore M. H. G. Fell, Surgeon-Commander R. St. G. S. Bond, Colonel G. S. Elliston. *Committee.*—Navy: Surgeon-Commander R. St. G. S. Bond, Surgeon-Commander R. J. MacKeown. Regular Army: Lieutenant-Colonel W. Clayton Smales, Lieutenant-Colonel E. P. Sewell. Air Force: Squadron-Leader A. Grant, Squadron-Leader P. M. Keane. Territorial Force: Lieutenant-Colonel P. Caldwell Smith, Captain S. H. Daukes. Temporary commissions: Captain A. B. McMaster, Major J. H. Peck. The committee has power to add two members. *Representative of the Group on the Council of the Society.*—Colonel H. W. Grattan.

The Honorary Secretary of the group is Major W. N. W. Kennedy, Town Hall, Croydon, who will be glad to receive names of intending members. The membership of the group already exceeds 70.

Reviews and Notices of Books.

INDUSTRIAL COLONIES AND VILLAGE SETTLEMENTS FOR THE CONSUMPTIVE.

By Sir G. SIMS WOODHEAD, K.B.E., V.D., M.A., M.D., LL.D., and P. C. VARRIER-JONES, M.A., M.R.C.S., L.R.C.P. With preface by Sir CLIFFORD ALLBUTT. Cambridge University Press. 1920. Pp. 152. 10*s.* 6*d.*

INDUSTRIAL colonies for consumptives have been subjected to so much overt shelling and covert sniping that it is high time the scattered defences were collected and organised. The authors have unfortunately not put their case before the public in a single work written for the occasion; their book consists mainly of a collection of papers already published at odd intervals and subsequently revised. The result of this labour-saving device on the part of the authors is to add to the labours of the reader, who will find the principal theses considerably diversified and diluted. One of the most attractive features of this book is the earnest attempt shown to comprehend the working man's point of view. The authors denounce the common practice of regarding the working-class consumptive as a slacker because his actual vigour does not tally with a robust exterior. His reputation for slacking probably depends not only on bodily weakness, but on his attitude towards the monotonous and irksome work to which he is often set at sanatoriums. As the authors point out, it is just as easy to grade useful as useless work, and the working man objects very strongly and naturally to labour savouring of the treadmill. It is also recognised that work in a colony must primarily be remunerative to the patient, not to the colony, and that any attempt to exploit consumptive labour must be nipped in the bud. The results so far of the Cambridgeshire After-Care Association's work are almost too good to be convincing. During the period under review—three years—52 patients in the first and second stages have been assisted; only one has died, the others at the time of writing (November, 1917) were all engaged in remunerative work. Why do not the authors bring these figures up to date? It is not anticipated that non-infectious, early, and able-bodied cases will remain longer in the colony than is necessary for the recovery of health and working capacity, but the chronic sputum-positive case with a 50 per cent. working capacity will, it is hoped, settle down. Much of the book is devoted to an analysis of the psychology of the consumptive, but the consumptive reader will more than once ask himself the question: Do the authors really understand the "true inwardness" of the consumptive? The bitter pill of segregation is sugar-coated, but will not the recipient lick off the sugar and then refuse to swallow it? The authors reiterate the tragic fate of the working man succumbing to tuberculosis without State aid, and the picture they draw is as true as it is gloomy. But they have hardly gauged the British working man's individualism, his attachment to any kind of hovel which he has learnt to call home. The proof of the pudding is in the eating, and it is probable that if industrial colonies are ever to prove a success the sponsors of the Papworth Colony should make them one. After all, the fate of such a colony depends primarily on its head, and the wisest words in the whole book are to be found in the closing sentence of the preface by Sir Clifford Allbutt. "Whosoever undertakes to follow in the same way, and proposes to start a colony, let him first find the man."

DIAGNOSTISCHER LEITFADEN FÜR SEKRET- UND BLUTUNTERSUCHUNGEN.

Second edition. By C. S. ENGEL. Leipzig: Georg Thieme. 1920. Pp. xv. + 303. 12*s.*

THE second edition of this work covers much the same ground as does an English manual of clinical pathology. Part I. deals with practical laboratory details, such as the use of the microscope, culture

media, bacterial stains, and gives a short account of the life-history of the more important bacteria and protozoa, with a section on immunity. Part II. deals with the clinical pathology of the different organs and their secretions. Information on the examination of the urine and of the blood is given in considerable detail, while the section on puncture fluids is meagre. Morbid histology is not dealt with, being presumably considered outside the range of the work. The laboratory methods do not, of course, correspond in every case with those used in British laboratories, but the differences are not vital. The description of the standardisation of the Wassermann reaction is rather inadequate.

The illustrations are disappointing. Some depict pieces of apparatus—such as a burette and stand—which should surely be familiar to every student without a drawing; whilst others—notably those showing films of pus and bacteria—do not convey at all a clear impression of the morbid material they are supposed to represent. Apart from this question of diagrams, the book gives a clear, concise account of the subject, written from a practical standpoint, with a minimum amount of theoretical discourse. No references are given.

TEXT-BOOKS ON COLLOIDS, OSMOSIS, AND CATALYSTS.

An Introduction to the Physics and Chemistry of Colloids. By EMIL HATSCHEK. Third edition. London: J. and A. Churchill. Pp. 114. 4*s.* 6*d.*—It is a remarkable fact that the pioneer work of Thomas Graham in the early "sixties" on colloids and crystalloids in his classic experiments on dialysis was allowed to fall into desuetude for so many years, and that recent investigations have brought to light the truism, to quote Professor Wolfgang Ostwald, that all life processes take place in a colloidal system. The history of the subject and its modern development are well and clearly set out in this volume, the author of which is well known for his fruitful studies of the colloidal state. Within its compass the book presents a very good and readable groundwork of the subject which will be of assistance to those who are on its threshold.

Biochemical Catalysts in Life and Industry. By JEAN EFFRONT. Translated by SAMUEL C. PRESCOTT, assisted by CHARLES S. VENABLE. New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd. Pp. 752. 28*s.*—The translation into English by Samuel C. Prescott, Professor of Industrial Microbiology in the Massachusetts Institute of Technology (assisted by Dr. Charles S. Venable), of Dr. Effront's work adds substantially to our literature on the subject. Dr. Effront's work in his capacity as professor in the New University and director of the Institute of Fermentations of Brussels has made him peculiarly conversant with the class of substances known as biochemical catalysts. While there is an interesting account in the concluding chapter (VI.) of the applications of enzymes in industry, the main issue bears on a consideration of the preparation, nature, and action of these remarkable substances. Thus of six parts five are devoted to (1) the coagulating enzymes, (2) pepsin, (3) trypsin, (4) erepsin, and (5) amidases. The book therefore claims attention as a contribution of substantial importance in connexion with the study of biochemical phenomena. The subject is a very absorbing one, and is here dealt with comprehensively and in attractive fashion both from an academic and industrial point of view. The study of the rôle of the catalyst in both organic and inorganic realms is adding decidedly to the sum of our knowledge of vital processes and chemical reactions.

Colloids in Biology and Medicine. By Professor H. BECHHOLD. Authorised translation from the second German edition by JESSE G. M. BULLOWA, A.B., M.D. New York: D. Van Nostrand Co. Pp. 464. 31*s.* 6*d.*—In spite of the author's disclaimer that it was not his purpose to make this book exhaustive, he has certainly succeeded in presenting a wide view of the subject in its relations to biological and medical problems. A glance through the table of contents shows how he has attempted to confine himself to a consideration of such applications rather than to a study of the purely physical aspect of the subject. The chapters on the bio-colloids (food substances, enzymes, immunity reactions), the organism as a colloid system, toxicology, and pharmacology bear plain evidence of this. He points out with truth that though they have a much wider distribution than crystalloids, it is only a little over 50 years that colloids have been seriously studied, and yet plants and animals and all the things we manufacture from them, such as our clothing and the greater part of our household goods, are colloids. The common substance glue (κόλλα) proved to be the foundation of a great and important study which formed the basis of the investigations of Thomas Graham (here described as "an Englishman") in 1861, who classed substances into colloids (non-diffusible) and crystalloids (diffusible). In Part III. is ably brought out the significance of the colloidal condition for the organism. The keynote here is the influence of membranes upon the interchange of substances. This section includes chapters on metabolism, growth, the cell, blood respiration, circulation and its disturbance, secretion, and excretion. The chapters on toxicology and pharmacology give an excellent résumé of, and essay on, the rôle of colloidal drugs within the system, including a section on the action of bactericides from the colloidal point of view. Altogether the volume is a learned and enlightening dissertation on a subject of rapidly increasing importance.

The Use of Colloids in Health and Disease. By ALFRED B. SEARLE. With foreword by Sir MALCOLM MORRIS, K.C.V.O. London: Constable and Co., Ltd. 1920. Pp. 120. 8*s.*—The author does well to point out in this volume that the value of drugs in presumably the colloidal state may quickly be discredited if, as a matter of fact, the product is not strictly colloidal, or, if so, is not stabilised. It seems to us that the preparation of colloidal medicaments calls for control, as otherwise a promising field of treatment may lie fallow or, worse, become choked with weeds. It must be admitted that the preparation and stabilisation of colloids is not yet an exact science, or at all events has not attained a definite system of standardisation, though there are well-known preparations on the market which fulfil recognised conditions. The whole subject is in its infancy, but developments of particular interest to medicine and industry are pretty certain to follow, considering the interest, theoretical and practical, which is being taken in the vista promised. We doubt whether the ideal has been reached in regard to either the manner of preparation of a medicinal colloid or of its physical preservation in its pristine condition. Future work, it may safely be foretold, will develop this question in detail, inasmuch that, as far as it has gone, it promises a new pharmacology. The chief value of Mr. Searle's book lies in acquainting the reader in simple terms with the history of the subject from Graham's time in 1861 to the present, when new and improved methods of preparing colloids are in evidence, and up-to-date methods of assuring the colloidal state of a preparation by means of the ultra-microscope amongst other things. Valuable sections of the book are devoted to the bearing of the colloidal state on hygienic applications, as, for example, the meaning of lavage by soap, the colloidal conditions of sewage precipitation, and colloids as germicides and disinfectants, all of which should afford clear and interesting reading to those eager to keep in touch with fresh and important issues.

Osmotic Pressure. By ALEXANDER FINDLAY, M.A., D.Sc., F.I.C. Second edition. London: Longmans, Green, and Co. Pp. 116. 6*s.*—A clear exposition of osmotic phenomena as here set forth might have been expected from Dr. Findlay, who has devoted considerable attention to the subject. He presents in this volume an admirable synopsis of the investigations so far as they have been pursued, and the various views gathered together in clear sequence should give helpful instruction to the biochemist. There is much speculation, as the author shows, surrounding the question of the cause of osmosis and the action

of the semi-permeable membrane. Most attractive of all suggestions is that of M. Traube, who considered that semi-permeable membranes acted as "atomic sieves," which allowed molecules of certain dimensions to pass through, but prevented the passage of larger molecules. This theory has been discounted, however, by subsequent researches, and the present view appears to be a kinetic interpretation of osmotic pressure, according to which the pressure is due to the bombardment of the semi-permeable membrane by the solute molecules in a manner analogous to the kinetic explanation of gaseous pressure. The subject has not been exhausted, and Dr. Findlay indicates clearly in this book the lines on which further researches are indicated.

Catalytic Hydrogenation and Reduction. By EDWARD B. MAXTED, Ph.D., B.Sc., F.C.S. London: J. and A. Churchill. Pp. 391. 4*s.* 6*d.*—There are points of decided medical interest in this small volume. The possibilities of catalytic hydrogenation and de-hydrogenation in regard to the preparation of drugs from hitherto unseen sources, and the conversion of liquid fatty foods into solid foods, and the suggestion of the translation of hydrocarbons into substances of the same order open up a remarkable avenue. The industrial applications of catalytic agents are well summarised in their power to facilitate chemical change. We are yet only on the fringe of this subject, and remarkable developments in the future may be anticipated, judging from the striking results so far achieved, not only in the laboratory but in the factory.

JOURNALS.

British Journal of Ophthalmology, January to September, 1920.—January: An Epidemic of Macular Keratitis, by H. Kirkpatrick. This paper describes a form of keratitis, apparently not hitherto observed, which has been occurring in the city of Madras in an epidemic form. A somewhat similar epidemic was described by Major Herbert in 1901 as occurring in Bombay, but in that case the keratitis was described as "superficial punctate" and was associated with an encapsuled bacillus which in the present epidemic is lacking. Kirkpatrick suggests that protozoa which have escaped observation may be the cause.—The number also contains Notes on a Rare Form of Subconjunctival Granuloma met with in Central China, by P. L. McAll; an article on Trachoma among the Chinese in France by E. J. Stuckey, H. Tomlin, and C. A. Hughes, and An Analysis of 106 Cases of Perforating Wounds of the Eye occurring at a Military Centre in London by G. Maxted; also the important report of the British Council of Ophthalmologists on the Visual Requirements of Persons Licensed to Drive Mechanically Propelled Vehicles on Public Roads, with a summary of recommendations which have now been adopted in London.

February: On the Character and Treatment of Scrofulous Inflammations of the Eye, by L. K. Wolff (Amsterdam). This paper propounds a new theory as to the connexion between tuberculosis and phlyctenular disease of the eye—namely, "that the patient has had a tuberculous process in his eye before, which, however was cured by the normal power of resistance of the organism. That eye has now become hypersensitive to the tuberculous poison." When the external surroundings of the patient are unfavourable the tuberculous poisons are now and then mobilised out of the tuberculously inflamed lymph glands. In support of this hypothesis Schreiber is quoted to the effect that in 25 per cent. of 200 cases of phlyctenular inflammation of the eye he found tuberculous foci on the scars thereof in the chorio-retina. With regard to treatment, the author does not believe in the administration of tuberculin for these cases; the removal of the tuberculous foci by the excision of the lymph glands, though effective, is a severe operation and involves a risk of miliary tuberculosis. The favourable results of the X rays on tuberculous lymph glands, on the other hand, has so impressed him that he advocates this treatment in all recurring cases.—The number also contains a report on the ophthalmic work done in the Mesopotamian Expeditionary Force during 1917 and 1918, by G. McPherson; a note on the administration of cocaine with adrenalin and of eserine in the simple operation for cataract extraction, by H. Herbert; and some observations by T. P. Maynard on the weight, volume, and ash of human lenses; also an appreciation of Richard Middlemore by D. C. Lloyd-Owen, forming one of the series of articles on British Masters of Ophthalmology.

March: The Comparative Frequency of Defects of Visual Acuity among Accepted Aviation Candidates, Pupils, and Experienced Pilots, by A. P. Bowdler.—The Radical Cure of Gonorrhœal Iritis, by S. H. Browning. Speaking from a large experience as bacteriologist to Moorfields Hospital and to All Saints Hospital for Genito-Urinary Diseases, the writer says: "Practically every case of gonorrhœal iritis I have examined or have had examined has shown some disease of the prostate or vesicles, and massage of these organs has shown the presence of pus cells and often gonococci."—The Action of Hypophysin (Pituitrin) upon the Pupil of the Rabbit, by W. B. Inglis Pollock: a physiological research showing that hypophysin resembles adrenalin in that both act on the neuro-myal junctions.—In this number also M. S. Mayou describes a method of iridotomy which he has practised for several years, but which has not yet found its way into text-books (except his own).—B. T. Lang contributes a note on the relative frequency with which the different axes of astigmatism are found in practice.

April: The Influence of Prolonged Monocular Occlusion in Revealing Errors of the Muscle Balance, by F. W. R. Marlow (Syracuse, New York). It is usually taught that however variable the balance of the lateral eye muscles may be, that of the vertical muscles is constant—i.e., the tests for esophoria and exophoria may give different results at different times, but those for hyperphoria never do. By occluding one eye for a week or more at a time Dr. Marlow brings out not only a large amount of latent lateral error, usually exophoria, but in many cases an unsuspected amount of hyperphoria. The clinical bearing of this is important for cases which appear to be normal to ordinary tests and yet have symptoms pointing to hyperphoria.

May: The Refraction in Buphthalmia, by J. Herbert Parsons. This paper gives the optical reasons, worked out with mathematical formulæ, to show why the buphthalmic eye is not nearly so myopic as its axial elongation would suggest.—An Improved Iris Prolapse Operation for Glaucoma, by H. Herbert. The operation was first described in the Transactions of the Ophthalmological Society for 1919. It formed a subject of controversy at the recent Oxford Ophthalmological Congress.—A Discussion upon the Illumination of Mines with Particular Reference to Miners' Nystagmus. This discussion has already been commented on in our columns. The opening papers of T. Lister Llewellyn and H. S. Elworthy are here given and also a report of the discussion, in which many ophthalmic surgeons took part, as well as representatives of the mining and engineering industries.—There is also a paper by C. Goulden on the Treatment of Prolapse of the Iris following Accidental Perforating Wounds, with a Note on the Removal of Non-magnetic Foreign Bodies from the Anterior Chamber, and a note by E. E. Maddox on Artificial Epistaxis as a Substitute for Leeching.

In the May and June numbers Professor Schiötz contributes an article which will be useful to those interested in the controversy as to the best form of tonometer.—In the June number also will be found a useful form of tonometric chart devised by Harrison Butler.—Practical Sympathy for the Blinded, by Captain F. P. Pierson-Webber, himself a blinded man, is a short paper pointing out the way in which help will be most efficient in personal service devoted to the teaching of practical work, useful knowledge, exercise, and play. Credit is given to the National Institute for the Blind, St. Dunstan's, and several other organisations for their splendid work.—The number contains two papers by H. Kirkpatrick, one on Diseases of the Optic Nerve as met with in the Government Ophthalmic Hospital, Madras, the other on the Use of Magnesium Sulphate as a Local Application in Inflammation of the Conjunctiva and Cornea.—W. J. Rutherford relates a case of Spontaneous Rupture of a Glaucomatous Eye.

In the numbers for July, August, and September the subject of colour-blindness is prominent. J. Herbert Parsons attacks the theories put forward by Edridge-Green in his "Physiology of Vision," continuing a controversy started in our own columns, and in the September number there is a retort from the latter. In the July number H. Hartridge writes a paper on Young's hypothesis, based on work done in the physiological laboratory at Cambridge. In the August and September numbers colour-blindness is discussed in relation to heredity in an interesting paper by J. Schiötz. He gives reasons for believing that the inheritance conforms strictly to the Mendelian hypothesis.—P. H. Adams's article on Arteriosclerosis and the Eye (July) has already been noticed in THE LANCET.

In the August number Percival J. Hay writes on Some Plastic Operations about the Lids and Socket, and in the September number there are short articles by D. J. Wood and J. A. Lea on Accommodative Failure from Malaria, Influenza, and from Injury by Lightning.—Another contribution by D. J. Wood advocates a new operation for Detached Retina—the withdrawal of the subretinal fluid and its reinjection, together with normal saline, into the vitreous.

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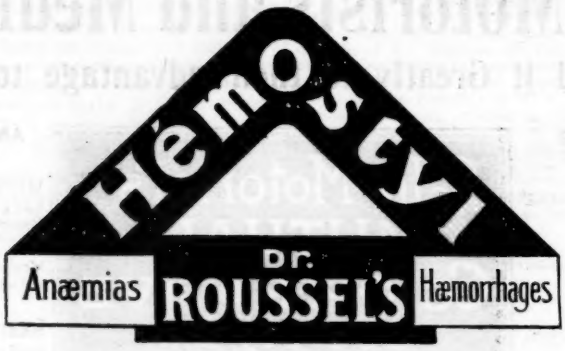

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THE LANCET.

LONDON: SATURDAY, OCTOBER 2, 1920.

The Cause of Cancer.

THE study of malignant disease is not as popular now as it was some 10 or 20 years ago, for an almost incredible amount of labour has resulted in comparative failure, and it has become fairly obvious that a facile triumph is not to be won in this field of scientific work. Nevertheless, cancer research will always have its votaries among those who refuse to ignore such an arresting mystery and who appreciate a problem in proportion to its difficulty. The subject is, indeed, of the utmost importance, not only in its direct application to an annual mortality which is sufficiently appalling, but also for the bearing it has on questions of general biology. For the solution of the cancer problem will certainly give us more than the conquest of malignant disease, and, paradoxical as it may sound, we shall probably not attain to complete knowledge of the biology of the normal cell till we understand that of the malignant one. Though the actual development of the cancer cell from non-cancerous tissue may be due to some single specific cause, the ætiology of malignant disease is clearly quite complex, depending upon many subsidiary predisposing factors. Some of these have been studied fairly exhaustively, and we may claim to speak with authority concerning them. Cancer has, for example, a definite age-incidence, and though exceptions may be met with from time to time the great majority of cases occur between the thirty-fifth and sixty-fifth year, the optimum age being 55 for men and 50 for women. Women are more prone to the disease than men in the proportion of 3 to 2, this difference being due to the high incidence of cancer in the breast and the uterus; in other organs the liability to tumour formation is much the same in the sexes. Again, the influence of heredity, so dreaded by the general public, has been defined; we now know that a cancerous ancestry need give rise to no serious anxiety, for breeding experiments with cancerous animals show that this factor, though not negligible, is of limited importance. Such indefinite factors as civilisation, diet, climate, and so forth may be neglected, since cancer is ubiquitous in the animal kingdom, and occurs under the most diverse conditions; statistical investigations have shown that the popular belief in the existence of cancer districts and cancer houses is without any real foundation. Of very real importance, however, are various forms of injury and irritation. Many types of cancer have been shown to result from prolonged exposure to certain chemical and physical agencies or to the irritation produced by the actual presence of parasites in the tissues. It has been shown that the application of coal-tar causes the development of squamous carcinoma in the skin of experimental animals, and FIBIGER has demonstrated the possibility of producing cancer in the stomach of rats by infecting them with *Spiroptera neoplastica*.

Such are the facts, but we are no nearer to an understanding of how these influences act. The older theories are no longer tenable; nevertheless, they have their value as warnings, for where the great have erred it is likely enough that smaller minds will come to grief. The theory of embryonic rests, upheld by COHNHEIM, can only account for a very small proportion of tumours, and even if the segregation and survival of such groups of embryonic cells be granted, the explanation why they should suddenly assume neoplastic properties is still to seek. Similarly, the theories of alteration in tissue tension are inadequate to explain the facts. WALDEYER and THIERSCH imagined that the normal state of equilibrium or tension between the epithelial and the connective tissues becomes disturbed as life advances by the earlier senescence of the latter, and ascribed the development of cancer to the liberation of epithelial cells from their accustomed physiological control. RIBBERT and his school, while believing that cancer arises in cells which have become physiologically isolated, regard this condition not as a manifestation of senility, but as the result of chronic inflammation. But neither in its original nor in its modified form can this theory have any bearing on the connective tissue growths, nor can it account for the known characters of the malignant cell. ADAMI is more in line with modern conceptions of the cancer process as a profound alteration of cell metabolism when he ascribes malignant disease to an alteration in the activities of the cell whereby function becomes lost and only the power of growth remains. But though this theory may explain the how of the process, it does not answer the question when and why. That cancer is a parasitic disease is a belief even now widely held, though there is little enough evidence to support it. Work in this direction has often seemed to be dominated by preconceived ideas; the theory has been the master, the experiment the servant. While the necessity for a causative parasite, such as, for example, the *Micrococcus neoformans*, is negatived by countless observations, the actual presence of a specific microbe has never been satisfactorily demonstrated, though the realms of bacteriology have been ransacked in the search. The success attending the application of bacteriology to the study of disease had been so striking that the hope that the cancer problem might be solved along these lines is not to be wondered at. But we must confess to failure in this as in other directions.

In another column Dr. ALEXANDER PAINE elaborates a point of view which merits serious attention. Briefly, he has come to the conclusion, from a general consideration of the subject and from the study of human and experimental material, that cancer is a degenerative process of the cell induced by prolonged chronic inflammation. He believes that the toxins of the infecting organism so affect the cell that, should it escape actual death, its power to function becomes entirely lost, and its metabolic activities are devoted to proliferation. In some respects this view of cancer follows certain of the previous theories to which we have referred, but it differs in important particulars. RIBBERT and his followers, for example, regard inflammation as the forerunner of cancer only inasmuch as it liberates the cells from the physiological control of the neighbouring tissues; they do not assume a direct action on the epithelial cell. ADAMI, again, claims for the malignant cell a loss of function and an increased power of proliferation, but he suggests that this is due to the acquisition of a growth habit, not to an actual degeneration and loss of the power of function. That Dr. PAINE'S views will be subjected to keen criticism there is no doubt. They are based on histological

studies which are notoriously extremely difficult, and on the assumption, on which many will join issue with him, that it is possible to recognise the inception of malignancy in a cell by variations in its morphology. Further, they lack the support of experimental proof, and this is very necessary in so intricate a subject. In a general survey such as Dr. PAINE'S present communication it is not possible to set forth all the evidence or to review all the applications of a new conception to the known facts of malignant disease. The theory will have to be tested in every direction; in the meantime it will be welcomed as providing a fresh starting-point for further investigations.

Medicine and Flying.

WHEN the industrial era was unfolding in the nineteenth century little personal thought and no hard thinking was given to the hygiene of industry, and there are long arrears of occupational disease and injury to atone for. Whole industries even have still to establish their right to exist before the tribunal of public health. We hope to do these things better in the twentieth century, and the new medium in and through which the business of the future is apparently to be transacted is being explored from the outset by medical as well as commercial pioneers. An effort has been made in these columns to keep readers in touch with the study of the medical problems of aeronautics as they have arisen abroad and at home, where much of the work done has been carried out under the auspices of the Air Medical Investigation Committee appointed by the Medical Research Council in consultation with the Air Ministry authorities. The volume[1] now issued by the Council brings together in convenient form a number of mutually dependent researches, already circulated through official channels among medical officers and others interested in aeronautics, but now made generally available.

Dr. HENRY HEAD'S masterly study[2] of automatic control in lower nervous centres, on which is based the sense of stability and balance in the air, is included in the volume. Other writers deal comprehensively with points of practical importance observed in the field, culminating in what is perhaps the most difficult problem of all, the airman's mental equipment. The essay entitled "Wind Up," by Dr. W. H. R. RIVERS, appended to the article on Mental Aptitude for Flying, by Dr. RIVERS and Major T. S. RIPPON, is singularly enlightening. Dr. J. L. BIRLEY'S report on the medical aspects of high flying, written with the experience of the medical officer in charge of the Royal Air Force in the field, demands close attention. The author has since dealt with parts of his subject more fully in his Goulstonian lectures.[3] The original nitrogen-dilution method of Professor G. DREYER for testing the effects of oxygen-want on flying men, set forth in the report, has since been modified by the use of apparatus devised by him in conjunction with Mr. G. F. HANSON. The new form of apparatus was exhibited at the Aeronautical Exhibition at Olympia recently. The simple "bag method" of FLACK, suitable for rapid but less accurate work, is also described. Using these methods the late Lieutenant-Colonel C. D. H. CORBETT and Dr. H. C. BAZETT carried out a laborious investigation into the reaction of pilots and observers to diminished oxygen pressure. This painstaking piece of work is elaborately illustrated with charts and tables showing the effect of such diminished pressure upon the respiratory and circulatory mechanisms in fit and unfit subjects. Scientific research has sustained a serious loss in the death on service of Dr. CORBETT. Cogent evidence of the value of the "efficiency tests" employed in the Royal Air Force is set forth in the papers by Wing Commanders MARTIN FLACK and A. P. BOWDLER on the Selection of Candidates for Flying; by Dr. FLACK on Tests for Flying Efficiency and Flying Strain; and by Dr. J. L. BIRLEY on Temperament and Service Flying. The value for air work of a sound circulatory mechanism is clearly brought out; the pulse-rate must not be unduly increased by exercise and should quickly return to the normal. The measurement of the systolic and diastolic pressure is important; the diastolic pressure should not fall below 70 mm. Hg or be combined with a pulse pressure greater than 50 mm. Hg. Investigation in regard to the neuro-muscular system shows that exaggerated reflexes alone appear to have no prognostic value, but marked tremor and poor equilibration in an airman call for very careful consideration. The measurement of the vital capacity is important, since this falls away with the onset of flying strain. For this reason the recent work of Professor DREYER is likely to prove of value in the selection of flying officers. Useful information is also obtained from the "fatigue test," which requires the subject to support 40 mm. of mercury with the breath held, the pulse being counted meanwhile. It is to be noted that the standards for all these tests were worked out in the first instance upon successful flying officers, and that the tests are designed to aid in the clinical examination of the subject, and not to supplant such examination. The tests also afford valuable information in assessing that difficult thing, temperament and the individual susceptibility and reaction to mental trauma. The importance of an adequate respiratory mechanism is also brought out in the papers by Dr. BAZETT and Dr. GRACE BRISCOE. Dr. BAZETT shows that men with a high vital capacity, a low consumption of air per minute, and a slow respiratory rate have a greater reserve than others to enable them to withstand high altitudes. Conversely, Dr. BRISCOE finds that officers found unfit for flying have a slightly but definitely higher oxygen consumption per minute than fit men. The last paper in the volume, by the late Dr. L. E. STAMM, deals with the combination of reaction-time tests and has already appeared[4] in full in our columns.

Thanks are due to the Medical Research Council for having produced a volume with the object of placing our knowledge of this subject upon a more trustworthy basis. We think it will materially help towards this end, and in the meantime the present compilation will give just that information which they need to all who are actively engaged with the medical problems of flying. The time is soon coming when the materials will be available for an elementary handbook of the medical principles of flying. The study has already resulted in enriching medical practice, for some of the methods described in the report will be found to have an application in medical work outside the realm of flying.

[1] The Medical Problems of Flying. Medical Research Council, Special Report Series, No. 53.
[2] THE LANCET, 1919, ii., 71.
[3] THE LANCET, 1920, i., 1147, 1205, 1251.
[4] THE LANCET, 1919, i., 206.

Food Economics.

IT is not enough to produce food. We must also see to its storage and preservation, unless we are content ourselves to go short at some period of the seasonal cycle and to allow others to starve all the time. The Food Investigation Board has long been dealing with the problem of perishable food and its preservation, and a brief outline of its work for the year 1919–20 is given in the report just issued[1] of the Department for Scientific and Industrial Research. Economical storage and transit can only be determined by knowing the physics and chemistry of foodstuffs inside and out, and every step should be taken to speed up the study of bio-chemistry and bio-physics to produce results available in practice and to enable us to balance the lean years against the fat years. The projected new laboratory at Cambridge should help in this direction. Fortunately, the engineering problems of cold storage and of carrying fresh meat and fruit are being solved, and the bacteriologists are getting to know which moulds and yeasts must be carefully locked up in the Pandora box and which are harmless enough to be let roam about. The question of transport affects the fishing industry in a peculiar degree, for the miraculous draught avails little unless it can be transported to its consumers, and small progress towards economical national housekeeping can be made so long as the glut of fish is liable to be returned to the sea which gave it or placed to rot on the land. From the land food has to be wrested by the sweat of man's brow, and he cannot afford to forego the free offerings of the sea. The Engineering Committee of the Food Board is now busied with the construction of refrigerator wagons suited for use in this country; while the Board's Fish Preservation Committee has completed its report on the freezing of fish in time of plenty, based upon experiments carried out both at Billingsgate Market and University College, London. Progress is also recorded in the means for preserving meat, milk, and fruit, and in avoiding the moulds and spots which tend to spoil animal food while in the refrigerating chambers. Beef, it appears, may soon be preserved by freezing without altering the muscle substance; heretofore the frozen fibres in thawing lost a large part of their nutritive material in the form of hæmoglobin-stained fluid. Experiments on the storage of fruit, recorded in the report, are of peculiar interest. By the employment of certain artificial atmospheres in the storage chambers the life of the fruit may be greatly extended. The respiratory metabolism of fruit at low temperatures has been studied, and search made for the oxidising enzymes responsible for the discolouration of certain fruits when bruised. The use of chemical preservatives is not discussed in the report, although this method of preserving food is tempting to the producer. We may assume that the control over such preservatives in food as boracic, salicylic, or benzoic acid, and the fluorides, to quote examples, which suggest possible injury to health, is carefully maintained under the Sale of Food and Drugs Acts. Presumably the smoke deposit on the kipper and the impregnated salt in pickled beef come outside the category of chemically treated foods. The report as a whole, upon which we have touched but lightly, is certainly cheering for the consumer.

[1] Cmd. 905. H.M. Stationery Office. 1s.

Annotations.

"Ne quid nimis."

WORK OF THE ROCKEFELLER FOUNDATION.

IN a handy and attractive volume Mr. George E. Vincent reviews the work in 1919 of the Rockefeller Foundations of which he is president. During this year the Foundation participated in activities of public health and medical education in 39 different governmental areas. Yellow fever control was successfully extended in Ecuador, Nicaragua, Honduras, and Salvador. In 1918 Guayaquil was selected as the most favourable centre for a fresh attempt to discover the organism which incites the disease, and Dr. Hideyo Noguchi, bacteriologist of the Rockefeller Institute, accepted an invitation to undertake research work in the city. He was at length able to cultivate from the blood of infected animals a minute, delicate, thread-like, spiral organism to which he gave the name *Leptospira icteroides*. Although Noguchi did not claim to have discovered the inciting germ of yellow fever, he was able to prepare a serum which has been administered in a number of cases with apparently favourable effect; the trial was, however, on too small a scale to decide the actual value of the serum. It seems likely that a means of identifying yellow fever has thus been found. The average number of cases annually reported in Guayaquil for the years 1912–18 inclusive, was 259, the total reaching 460 in 1918. At the end of that year a representative of the International Health Board of the Foundation arrived in the city to organise a campaign of eradication. Nothing was left undone by the Government and the city authorities which might ensure success. The aims of the campaign were: (1) The earliest possible discovery of cases of the disease, which were promptly isolated and screened from mosquitoes; (2) elimination of the stegomyia by denying the females access to water in which to deposit their eggs. Receptacles for water were protected in various ways; minnows were used to destroy mosquito eggs in supplies which could not be covered. By January, 1919, the control work was far advanced; since June, 1919, no case has been reported. Vigilance will not be relaxed for at least a year. Meanwhile, offers of similar assistance were welcomed by the Governments of Honduras, Nicaragua, and Salvador, and the Foundation despatched a group of experts, headed by the late General Gorgas. In each country government commissions were created to take charge of control measures, and these several commissions coöperated in an international programme for the protection of all the areas concerned. By the middle of October yellow fever had been practically banished from Central America. The Foundation proceeded with diversified attacks of malaria; experiments in control were continued in six towns in Mississippi and Arkansas, and begun in four others. Anti-mosquito measures were chiefly relied upon. The practical aims in view were: (1) to eliminate anopheles by preventing their breeding; (2) to screen houses against this mosquito; (3) to sterilise by quinine the blood of human malaria carriers. A reduction of 67 per cent. in the prevalence of malaria was secured. In June, 1919, a conference was held to plan a concerted campaign against malaria in the Southern States. The International Health Board of the Foundation continued its measures of hookworm control; in 1919 work was carried forward in 25 different States and countries, suspended in two countries, and inaugurated in eight new areas. The antituberculosis campaign begun in France in 1917 was extended. Its definite objects were: (1) the setting up in typical urban and provincial areas of standard demonstrations of systematic control methods; (2) the training of public health nurses, clinicians, lecturers, and organisers; (3) the arousing of communities to the need of creating local agencies, governmental and voluntary; (4) the education of the public; (5) the gradual transfer of responsibility to French agencies and the organisation of these agencies on a national basis. Progress was made in

each of these directions. During the year the Commission added to its educational devices the Guignol, the French Punch and Judy, which was seen by 67,000 children. Twenty-eight departments and 293 towns were visited by the Commission's exhibits, and 700,000 people were reached directly. In the United States the School of Hygiene and Public Health at Johns Hopkins University, established by the Foundation and opened in 1918, continued to give instruction and encourage research, and established relationships with the community and the field. In China the Peking Union Medical College, which is controlled by a board of trustees chosen by the Foundation and six coöperating British and American missionary societies, has recently been opened, and is being built and maintained by Foundation funds. A sum of $5,000,000 was recently set aside for use in Canada. In order to provide expert direction for the growing work of the Foundation, the board created a division of Medical Education. During the year fellowships and scholarships were provided for 85 persons resident in universities in the United States; 13 research fellows in physics and chemistry were also supported. The Foundation continued from time to time to provide funds to standing or special committees for surveys or studies. The report closes with a summary of the receipts and expenditures for the fiscal year 1919, and a note on the organisation of the Foundation. The complete annual report, to include details of the work of the International Health Board and the China Medical Board, will be issued during the autumn, but enough has already appeared to give the reader a good insight into the output of a most beneficent undertaking.

THE LYMPHADENITIS OF HERPES ZOSTER.

AT a meeting of the Société Médicale des Hôpitaux of Paris, MM. Louis Ramond and Roger Lebel made a communication on a most interesting sign of herpes zoster which has been observed only in recent years—primary enlargement of the lymphatic glands of the affected area. It was first pointed out in 1892 by a French dermatologist, Barthélemy, and has now been briefly described in the text-books. MM. Ramond and Lebel have never found it absent in the course of ten years, during which they have looked for it systematically. They consider that it merits greater attention than has been bestowed on it, and should rank with the pain and eruption in the definition of herpes zoster. Into the symptomatic triad thus formed it brings a new element, clearly infective, and more useful than the fever, which is often absent or overlooked, in distinguishing zoster from zosteriform eruptions. This primary adenitis must be distinguished from the adenitis secondary to infection of the ulcerated vesicles. The enlarged glands are those into which the lymphatics from the affected area drain. To feel them the axilla must be explored in zona of the upper limb or of the trunk above the umbilicus, and the groins in zona of the lower limb or of the trunk below the umbilicus. In ophthalmic zona the preauricular gland is engorged; in occipital, the suboccipital glands; in maxillary (superior or inferior), the submaxillary and suprahyoid glands; and in cervical, the superficial cervical. Sometimes adenopathy may be observed in glands lying outside the main group. Thus in a case of intercostal zona a gland of the size of a small filbert was found at the angle of the scapula. Like the eruption the adenitis is unilateral, but Barthélemy has observed one case of intercostal zona in which the glands were affected on both sides, but more so on the side of the eruption. MM. Ramond and Lebel have found that the adenopathy appears early and accompanies the slightest eruption whatever its stage, even when only erythematous. Clinically the adenitis is characterised by tumefaction and tenderness—never by spontaneous pain. Hence in regions not likely to be rubbed, such as the axilla and groin, it is overlooked. On the other hand, in exposed situations it may be the symptom for which the patient seeks advice, when the eruption is slight or concealed by the scalp. The adenitis is at its height when the vesicles appear. It then diminishes and disappears about the seventh day. This is important, for at that time the vesicles are more or less ulcerated and a prey to secondary infection. Spontaneous recovery is thus the natural termination and suppuration does not occur. Nothing can be more simple than its value as a positive sign. But the secondary adenopathy, whether of herpes zoster or of herpes simplex, due to infection of the vesicles, must be distinguished. This is rare, and is not a symptom of zoster but a complication due to infection of the vesicles, and therefore appears late. The adenopathy generally affects only one gland. It is voluminous and clearly inflammatory, with tendency to suppuration. There are periglandular swelling, alteration of the skin, and often lymphangitis. The same holds for the adenopathy of zosteriform eruptions. Uncomplicated simple herpes and uncomplicated zosteriform eruptions are not accompanied by adenitis. Hence its value in differential diagnosis. The adenitis of zona, being independent of secondary infection, seems to be due to the still unknown pathogenic agent of the disorder. The primary lesion evidently occurs in the ganglion of the posterior root of the nerve supplying the affected area. This lesion may act directly on the gland or indirectly through the intermediary of the cutaneous lesions. How the lesion of the distant ganglion can produce the acute inflammation of the skin, which is now well established, or the lymphadenitis MM. Raymond and Lebel did not discuss. Pain or degenerative or even vaso-motor changes is easily comprehensible, but the production of acute inflammation is a curious pathological fact which stands alone.

MENTAL NURSING.

IF the supply of probationers in the training hospitals is inadequate, the temporary disfavour into which nursing has fallen as a profession for educated women is causing even greater inconvenience in those institutions which cannot offer a general training. Staff recruiting for fever hospitals is difficult; for mental hospitals it is almost desperate. Leaving out of account the general nursing problem, the causes of the relative shortage of candidates for these two services are not far to seek. They include the geographical situation of fever and mental hospitals, which is usually isolated, and the diminished opportunity of social intercourse caused thereby, and also by the dislike of the lay public to enter such places, however accessible. Indeed, the fever nurse is not very welcome as a visitor outside the hospital walls, while the mental nurse is regarded with what may amount to a curious dread. Not only is the social status of workers in these specialised branches of nursing less secure, but the actual work seems to be found less interesting in the one case and more depressing in the other, besides appealing less to the immature imagination. Service in a general hospital is felt to be offered to the sick poor, and only indirectly to the whole community; patients are there entirely for their own benefit. In the fever hospitals patients on the whole need less varied individual attention, and often remain after they are apparently well because their detention is still necessary in the interests of others. In the mental hospitals reports of the tediousness of the cases and the small proportion of cures do not encourage the prospective nurse, and her duties under present-day conditions appear to be concerned mainly with the protection of the public by helping to segregate the insane. In his annual report of The Retreat at York Dr. Bedford Pierce, the medical superintendent, touches on this subject, and attributes the unpopularity of the mental service not to questions of pay or of long hours, but partly at least to the rarity of good posts and the poor prospects of developing a career. The avenue of promotion is often closed because it is convenient to bring in general hospital-trained nurses as matron and assistant matron. Dr. Pierce chronicles the purchase of a home for the treatment of patients suffering from nervous and mild forms of mental disorder in connexion with The Retreat, but emphasises that the nursing staffs will be quite distinct. This seems an unfortunate arrangement, as an occasional period of service with uncertified

borderland cases would surely be beneficial to nurses and to both classes of patients. In the future the treatment of nervous instability and of the milder forms of insanity will tend to approximate, and the fully-trained mental nurse should have the opportunity of studying cases at every stage.

OSTEOMYELITIS OF THE HYOID.

IN a recent communication to the Berlin Surgical Society Professor F. Lotsch[1] recorded the case of a man, aged 44, who, after an attack of influenza in November, 1918, developed an abscess on the right side of the neck at the level of the hyoid bone. Suppuration persisted for a long time, and the patient showed a distinct loss of flesh, so that the possibility of a new growth occurred to the practitioner in attendance. In May, 1920, as the wound showed no tendency to heal, it was freely opened by Professor Lotsch, and the sequestrated right thyro-hyal cornu was found lying free in a bed of granulations. The sequestrum was removed, and the sinus rapidly healed. Inflammatory disease of the hyoid bone, extremely rare in occurrence, may be chronic or, still less frequently, acute. A case of actinomycosis of the hyoid cured by curetting is described by Halter. Syphilitic affection of the bone may be due to extension of a laryngeal perichondritis or constitute an isolated localisation of the disease, as described by Elliot. Tuberculosis of the hyoid has been observed by Ullmann. Only two previous cases of acute inflammation of the hyoid have been described by Stetter and Luxembourg respectively, in which rapid recovery took place after evacuation of the abscess. In Luxembourg's case, as in that of Professor Lotsch, the right thyro-hyal cornu was sequestrated, As the whole of the hyoid bone can be removed without any disturbance of function it is not surprising that the loss of one cornu leaves no bad effects.

[1] Deutsche medizinische Wochenschrift, Sept. 16th, 1920.

A POLISH REVIEW OF EPIDEMIOLOGY.

THE State Epidemiological Institute at Warsaw has started the publication of a *Review of Epidemiology*, to be completed in a yearly volume of about 800 pages, parts being published every second or third month when sufficient material accumulates. It is proposed that the review shall include original contributions embodying results of research work in the departments of bacteriology, serology, parasitology, and epidemiology, including medical statistics, as well as original articles on any of these subjects. Abstracts of current foreign literature and reviews of special subjects are to appear in every issue, which will also contain a précis of the achievements of the bacteriological service of the Polish public health authorities, as well as other news bearing on the epidemiological situation of Eastern Europe. Every original contribution in Polish will be followed by a short summary in English, French, or German. The first number contains articles by Professor R. Weigl, of Lemberg, on Rickettsia Prowazeki, and by Dr. L. Anigstein (from the Warsaw Institute) on the Blood Picture in Typhus. In view of the dearth of paper and the economic conditions generally in Poland, considerable effort has evidently been spent on the production of the review, which reflects no little credit on Dr. Ludish Rajchman, the director of the institute.

SEEING IN THE DARK.

THE remarkable skill shown by bats in avoiding objects during their flight is familiar. Three views have been propounded to explain this phenomenon. (1) That bats are endowed with very keen sight, which enables them to see when everything is dark to man. (2) That their sense of touch is extraordinarily acute, particularly at the wing tips. (3) That they possess some sense the knowledge of which is not possessed by men. In a recent number of the *Journal of Physiology* Dr. Hamilton Hartridge criticises and discards all three views, in view of his own experiments. On summer evenings pipistrelle bats—sometimes between one and two hundred at a time—used to fly through the open windows into the adjacent rooms communicating by an intervening door, capable of being illuminated by electric light or completely darkened. As a rule, in the rooms the bats all flew roughly in the same direction, but even when the electric light was turned off nothing indicated that collisions occurred. Even when threads were placed in their path it appears that bats in full flight and in what seems to us absolute darkness can not only steer round a room and avoid one another but can avoid obstacles such as threads. Further, that they can tell whether a door is shut or open wide, or just sufficiently wide open to allow them to pass. These and other experiments appear to exclude vision and touch as the senses determining the directional control of their flight at night. The hypothesis is advanced that the flight of bats is directed by a special sense of hearing, since the sound waves of short wavelength which they are known to emit are capable of casting shadows and of becoming sound pictures.

ROCKY MOUNTAIN SPOTTED FEVER.

ALTHOUGH the incidence of this eruptive fever is at present limited, so far as is known, to the sparsely-populated and mountainous north-western region of the United States, it is conceivable that under certain conditions the infection might extend to other areas. The disease is of interest owing to its close clinical resemblance to typhus fever with which it was formerly confused; but careful investigations have shown it to be a totally distinct specific fever. The name "spotted fever" is objectionable, being sometimes applied to typhus as well as to cerebro-spinal fever. The disease is transmitted to man through the agency of a species of tick (*Dermacentor venustus*), and it would be preferable to employ the synonym "tick fever" or "tick fever of the Rocky Mountains." During the last 20 years the malady has been investigated from different points of view by American medical experts, including members of the U.S. Public Health Service, one of whom, it may be mentioned, contracted the disease in the course of his investigations and died. The latest contribution to the literature of the subject has been made by Dr. S. Burt Wolbach, of Boston, the results of whose inquiries, made at the request of the authorities of the State of Montana, were published in the *Journal of Medical Research* for November, 1919. We have now received a reprint of his report.[1] Dr. Wolbach summarises the present state of our knowledge of the disease. Of the nine American States known to be infected Montana and Idaho have suffered most in the past. The spread of the fever was formerly attributed to the melting snow and the rotting sawdust of lumber camps; this belief is still firmly held by the local population, which refuses to accept conclusive proof that the tick is the transmitting agent of infection. Statistics respecting the incidence of tick fever are difficult to obtain owing to the remoteness of the areas involved and the lack of notification and certification of cases and deaths in these localities. Its virulence varies greatly in different districts. In an instance quoted by Dr. Wolbach one side of a valley had for some years yielded many cases of tick fever, while the opposite side remained free from it. It is believed that the reservoir of tick-fever virus is some animal other than man, and certain investigators strongly suspect the ground squirrel. The infected female tick transmits the infection to its offspring. Though the infection is usually conveyed by the blood-sucking tick, the disease is easily produced in experimental animals by intraperitoneal or subcutaneous injection. The larvæ and nymphs of the tick feed upon small animals, such as the wood rat, mouse, and ground squirrel, while the adults feed chiefly on larger mammals, such as horse, cow, and sheep in settled districts, or wild goat, brown bear, and

[1] Studies on Rocky Mountain Spotted Fever, by S. Burt Wolbach (from the Laboratories of Bacteriology and Pathology of Harvard University Medical School and the Pathological Department of the Peter Brent Brigham Hospital, Boston). Reprinted from the Journal of Medical Research, November, 1919. Pp. 197, with 21 plates.

coyote in a state of nature. In some districts the jack-rabbit is the only animal acting as host to all three stages of the tick, larva, nymph, and adult. Dr. Wolbach claims to have discovered the specific organism of the disease, but he has been unable, up to the present, to cultivate it. He found this organism constantly present in the lesions characteristic of the malady in man, monkey, rabbit, and guinea-pig. He describes three morphological types of the parasite, one of which he regards as the form in which the virus is passed between the tick and its mammalian host; the other two are what he believes to be developmental forms of the organism. He found it in ticks which had been shown to possess infectivity, such organisms being absent in other ticks which were proved to be free from infection. He gives to the parasite the name *Dermacentroxenus rickettsi*. If Dr. Wolbach's results are confirmed by other experts a considerable advance will have been made in the elucidation of the ætiology of this interesting eruptive fever.

IMMUNITY AND RESISTANCE IN MALARIA.

THE problems of the mechanism of action of malarial fever and the mode of action of quinine in this affection are as yet unsolved. Such is the opinion of Dr. Guido Cremonese,[1] who maintains that it is absurd to admit that the organic defence against malaria has a different mechanism from that found in other diseases, and formulates a theory which he considers the key to the mystery—namely, that the antigen of malaria, analogous to that which obtains in bacterial affections, is the pathogenic parasite itself, but only in its extracellular stage of merozoite, and that when once the parasite has entered into the blood corpuscle it ceases to act as antigen. Hence the defensive element of the blood serum can attack the parasite only in its extraglobular state; as soon as it has entered the corpuscle it is safe. The febrile reaction, which is at first irregular owing to the continuous formation of antigens, becomes regular by the formation of antibodies and by the natural period of incubation of the parasite. This explains why the Bordet-Gengou reaction is sometimes positive and sometimes negative, antigen and antibody being not always present. Quinine fixes itself in the blood cells and ejects the parasites, and hence, when given before an attack, compels the parasites to remain outside the corpuscles and become an easy prey to antibodies. The initial fever is continuous because there is not yet sufficient serum reaction, and this reaction, in conjunction with the period of schizogonic incubation, establishes the apyretic periods. With the gradual preponderance of formation of antibodies spontaneous cure may be attained, whereas by diminution of their formation cachexia is induced. Quinine tends to intoxicate the red cell which, in order to defend itself, sends out more and more receptors until, becoming exhausted, it disintegrates (hæmoglobinuria); or, on the other hand, if it has sufficient force to defend itself it repels the quinine and a condition of quinine resistance is produced, and then the parasite regains its own activity in spite of the administration of quinine. According to Dr. Cremonese, this mechanism affords a complete explanation of all obscure points in the malarial process, like a master-key which opens all the doors in a house, and brings the theory of serum reaction into relation with the mechanism of malaria.

UMBILICAL CONCRETIONS.

ACCORDING to Dr. Miles F. Porter, of Fort Wayne, Indiana, who reports[2] an illustrative case in a woman, aged 62, umbilical concretions are rare, only 28 cases having been reported by Cullen in his classical work on diseases of the umbilicus, published in 1916. The condition is rarely recognised until some complication draws attention to it. Pain referred to the umbilical region is usually the first symptom noted, but the pain may be referred to the whole abdomen and be of a very severe, cramp-like, and periodic character, sometimes leading to the extrusion of the concretion. Chronic and periodic discharges from the umbilicus, accompanied by signs of local infection, is suggestive of the presence of a concretion, and there is little difficulty in establishing a diagnosis in a given case if the possibility of this condition be borne in mind. Umbilical concretions have been mistaken for cancer, tuberculosis, and dermoid cysts. In Dr. Porter's case the condition was regarded as a pigmented mole of the umbilicus, with the possibility of malignancy in view of the fact that the abdomen was covered, especially in its upper part, by a large number of pigmented moles and the patient was of cancer age. The abdomen was therefore opened, the gall-bladder, which contained many stones, was removed, and the umbilicus, with the contained tumour, was excised. Examination of the tumour showed that it consisted of a firm, hard collection of skin detritus. Had it been recognised as an umbilical concretion, which had never been suspected, the treatment would merely have consisted in dilatation of the umbilical opening, removal of the foreign substance, and cleaning of the cavity.

[1] La Malariologia, 1920, No. 1.
[2] Journal of the American Medical Association, August 28th, 1920.

THE CAUSES AND PREVENTION OF BLINDNESS: DEPARTMENTAL COMMITTEE APPOINTED.

THE Committee appointed by the Minister of Health to investigate and report on the causes of blindness, including defective vision sufficient to impair economic efficiency, and to suggest measures which might be taken for the prevention of blindness, consists of the following members: Right Hon. G. H. Roberts, M.P. (chairman), Mr. Stephen Walsh, M.P., Mr. N. Bishop Harman, F.R.C.S., Dr. J. B. Lawford, Mr. G. F. Mowatt, Mrs. Wilton Phipps, Mr. J. H. Parsons, F.R.C.S. (representing the Royal College of Surgeons), Dr. James Taylor (representing the Royal College of Physicians), Mr. J. C. Bridge, F.R.C.S. Ed. (representing the Home Office), Dr. A. Eichholz (representing the Board of Education), Mr. J. S. Nicholson (representing the Ministry of Labour), Mr. W. M. Stone (representing the Scottish Office), Mr. E. D. Macgregor (representing the Ministry of Health). A representative of the Medical Research Council is to be appointed later. Dr. R. A. Farrar and Mr. P. N. R. Butcher will act as joint secretaries to the Committee, and communications should be addressed to them at the Ministry of Health, Whitehall, London, S.W. 1.

THE death occurred at Manchester on Sept. 27th of Dr. David Lloyd Roberts, consulting obstetric physician to the Manchester Royal Infirmary, in his 86th year.

THE Entrance Scholarship in Anatomy and Physiology of the London Hospital Medical College, open to students of the Universities of Oxford and Cambridge, has been awarded to Mr. W. Russell Brain, of New College, Oxford, and the University Scholarship for 1920 (value £100) of St. Thomas's Hospital Medical School has been awarded to Mr. C. V. Patrick, of Rugby, and Caius College, Cambridge.

AT University College (University of London) courses of lectures on the History of Science will be held throughout the coming session, preceded by an introductory public lecture by Sir William H. Bragg, F.R.S., on Thursday, Oct. 7th, at 5 P.M. This lecture is open to the public without fee or ticket. A course of 12 lectures on the History of the Biological and Medical Sciences from Early Times to the Eighteenth Century will be given by Dr. Charles Singer on Tuesdays at 5.15 P.M., beginning Oct. 12th.

AT King's College (University of London) a special course of eight lectures on the Histology of the Nervous System will be given during the Michaelmas Term by Dr. C. Da Fano on Wednesdays, at 4.30 P.M., beginning Wednesday, Oct. 13th. The course is free to students and to medical men and others on presentation of their cards, and has been recognised by the University of London as one of the special courses for the B.Sc. honours degree. The lectures arranged by the Psychological Department of King's College for the coming session include courses on general elementary psychology, advanced psychology, and experimental psychology, to be held in the day and in the evenings. Special courses on advanced practical psychology, pathological psychology, mental measurement, and a tuition course for a diploma in psychological medicine will also be held.

THE FRENCH MEDICAL SERVICE IN THE FIELD.

BY R. J. BLACKHAM, C.B., C.M.G., C.I.E., D.S.O., M.D.,
COLONEL, LATE A.M.S.;

With assistance from G. LEMOINE, C.B., Médecin Inspecteur-Général; and O. GARRET, Médecin Major de 1re Classe.

ON the Italian front an interesting feature of the campaign was the opportunities afforded for the study of the French Army Medical Service. After returning to France, whilst serving with a corps forming portion of a French army, I had a unique opportunity of checking and expanding my notes prepared in Italy, and now submit them in the hope that they may not only be of interest, but possibly facilitate the work of British medical officers who have the privilege of working with French medical formations.

The Service de Santé.—The French Medical Service is called the "Service de Santé," and consists of officers and personnel.

The officers are: (1) Des Médecins (Medical Officers); (2) Des Pharmaciens (Pharmacists); (3) Des Officiers d'Administration (Medical Quartermasters).

The personnel consist of Infirmiers and Brancardiers, who are the rank and file of the medical service.

The grades of personnel are: (1) Sous-Aides Majors, Médecins Auxiliaires (Medical Students), and Dentistes Militaires; (2) Sous-Officiers, Adjudants-Chef, Adjudants (Serg. Majors), Sergents, and Caporaux (as in the infantry).

Grades of French medical officers.—The grades in the French Medical Service are:—

Médecin	Inspecteur-Général,	ranking as	Lieutenant-General.
"	Inspecteur,	"	Major-General.
"	Principal de 1re classe,	"	Colonel.
"	Principal de 2me classe,	"	Lieutenant-Colonel.
"	Major de 1re classe,	"	Major.
"	Major de 2me classe,	"	Captain.
"	Aide-Major de 1re classe,	"	Lieutenant.
"	Aide-Major de 2me classe,	"	Sub-Lieutenant.
Pharmacien	Inspecteur,	"	Major-General.
"	Principal de 1re classe,	"	Colonel.
"	Principal de 2me classe,	"	Lieutenant-Colonel.
"	Major de 1re classe,	"	Major.
"	Major de 2me classe,	"	Captain.
"	Aide-Major de 1re classe,	"	Lieutenant.
"	Aide-Major de 2me classe,	"	Sub-Lieutenant.

Officiers d'administration are graded as first-, second-, and third-class, and rank as captain, lieutenant, and sub-lieutenant. A few reach the grade of officier d'administration principal, with the rank of major. The médecin auxiliaires have the rank of adjutant or warrant officers, but are treated as officers by their commissioned superiors. We have nothing at all resembling them in the British Medical Service, as the assistant surgeons employed with the British Army in India are Europeans or Eurasians who have been through a complete medical curriculum in a Government college and have been granted a diploma qualifying them to practise in British India.

"Les officiers du Corps de Santé en France sont une hiérarchie propre comprenant des grades correspondant aux grades d'officiers combattants, mais avec appellations spéciales; il n'y a pas égalité entre médecins et combattants, mais seulement assimilation. Un Médecin Major de 2me classe n'est pas un capitaine. Un Médecin Major de 1re classe n'est pas un commandant; il est un peu moins. L'officier combattant a toujours, a égalité de galons, la préséance sur l'officier des services (Santé, Intendance, Service Vétérinaire, &c.)" (Garret.)

Uniform.—The field uniform of the French Medical Service is the same as that of other officers. They wear a gorget patch of cherry-coloured velvet with the snake of Æsculapius (le caducée) enclosed in an oval laurel wreath. The pharmaciens wear green velvet gorget patches. The quartermasters (officiers d'administration) wear a ten-pointed golden star on a red velvet background. Military dentists wear the uniform of adjudants of sections d'infirmiers, with the caducée in silver accompanied by the letter "D" on the collar. The letter is 1 cm. in size and placed externally to the caducée. They do not wear any braid of rank on "képi" or on the sleeve. The badges of rank of both médecins and pharmaciens are of gold.

The rank and file.—The rank and file of the French Medical Service is divided into two well-defined classes, infirmiers or hospital orderlies, and brancardiers or stretcher-bearers. I have always had great difficulty in explaining to French officers visiting my field ambulances that the rank and file of the R.A.M.C. with a field unit are fully qualified to act in either capacity.

The specially trained infirmiers (infirmiers de visite) always function as hospital orderlies and are distinguished by wearing on their collar a white caducée (snake and rod of Æsculapius) on a red background. The other infirmiers (infirmiers d'exploitation) carry out manual labour in the hospitals and may function as stretcher-bearers. On the other hand, in the divisional bearer company or the corps bearer company of brancardiers, a certain number of stretcher-bearers are employed in the special work of the infirmiers de visite.

Zones of the Medical Service.

The French Medical Service in the field is divided into two zones: (*a*) Service de Santé de l'avant; and (*b*) Service de Santé de l'arrière.

A. *Service de Santé de l'Avant.*

The direction of the medical services with the field army differs in many ways from the British.

(*a*) The Médecin Inspecteur-Général corresponds to our Director-General.

(*b*) With each group of armies there is an Inspecteur du Service de Santé au Groupe d'Armées. He has no analogue in our Service.

(*c*) With each army there is a Chef Supérieur du Service de Santé de l'Armée, corresponding to our Directeur of Medical Services.

(*d*) Each corps (corps d'armée) has a Directeur du Service de Santé du Corps d'Armée, who corresponds to our Deputy Director of Medical Services.

(*e*) Each French division has a Médecin Divisionaire, who corresponds to our Assistant Director of Medical Services.

The medical organisation of a French division differs in many ways from ours. There are the following formations: The Regimental Medical Service; the G.B.D., or Groupe des Brancardiers Divisionaires—i.e., Divisional Bearer Company; the S.S.A., or Section Sanitaire Automobile (Divisional Motor Ambulance Convoy); and the Ambulances or Field Hospitals (usually two).

The Regimental Medical Service.

The first thing which the British student of the organisation of the continental military systems has to understand is that a "regiment" corresponds to what we call a "brigade" in the British Service. Prior to the introduction of the Territorial system in our army, what are now known as "battalions" were distinguished by numbers and known as "regiments." Now, of course, the regiment embraces at least two regular battalions, sometimes one or two Special Reserve battalions, several Territorial battalions, and an unlimited number of Service battalions.

In our army four battalions, usually from four different "regiments," are grouped together for war purposes as a brigade.

Each infantry regiment in the French army has three battalions. Each battalion has four companies, of which one is a machine-gun company. In medical charge is a médecin chef du régiment, except in the Chausseur divisions. This officer may be a médecin major de 1re classe or a médecin principal de 2me classe, but is usually the former. He is on the staff of the colonel of the regiment, who corresponds to our brigadier. One of his principal functions is the charge of the poste de secours régimentaire and infirmerie. There is also a pharmacien du régiment who is under the orders of the médecin chef du service. Each infantry battalion should have a medical officer and a medical subordinate—i.e., a médecin aide-major de 1re or 2me classe and a médecin auxiliaire (junior medical student). In the Chausseur divisions each company has either a médecin major de 2me classe or a médecin auxiliaire. The battalion medical officers serve under the médecin chef du régiment, and not directly under the A.D.M.S. as in our army, except of course, in the Chausseur divisions, where there is no médecin chef du régiment. Each regiment has a sergeant of stretcher-bearers. Each battalion has 16 regular stretcher-bearers and 16 additional when required, exactly as in our army.

There are, in addition, four hospital orderlies (infirmiers) with a corporal infirmier in charge, for each battalion. The battalion medical officers form postes de secours, which correspond exactly with our

regimental aid-posts. As a rule, there are two of these battalion postes, one as near as possible to the front line, at which the médecin auxiliaire is stationed, and one farther back in charge of the médecin. In addition to the battalion postes there is a poste de secours régimentaire, where sick likely to recover in a few days are kept, to avoid their evacuation to the ambulances. This formation is practically a regimental rest station and has no analogue in our system.

Wounded are carried by the regimental bearers (Brancardiers du Régiment) from the front line to the regimental aid-posts, where they are taken over by the Groupe de Brancardiers Divisionaires which functions as the bearer divisions of our field ambulances, but, as will be seen below, is a distinct medical unit. Except during active operations the G.B.D. do not work up to the Postes de Secours and the regimental bearers carry the wounded back to the Relais de G.B.D., or bearer-posts.

Each battalion of infantry has a medical cart corresponding to our Maltese cart, which carries only the following material: (1) One medical pannier; (2) one surgical pannier; (3) two panniers with dressing material; and (4) two panniers with a reserve of dressing material. It is two-wheeled and drawn by one horse. The cart also carries a surgical haversack for each company stretcher squad, an orderly's pouch for each hospital orderly, a medical companion for the battalion, printed forms, 2 lanterns, 1 Red Cross flag, 20 brassards, 20 one-litre water-bottles, a water-barrel, a pouch for treating cases of asphyxia or drowning, and 8 stretchers. A four-wheeled ambulance-wagon for the transport of sick and wounded is detached from the Groupe des Brancardiers Divisionaires and placed at the disposal of each regiment of infantry on the march.

The G.B.D., or Groupe des Brancardiers Divisionaires.

This unit is the divisional bearer company, and is under the orders of the médecin divisionaire. A "groupe" consists of the following personnel: One médecin chef, who is a médecin major; two médecins aide-majors; one pharmacien; one officier d'administration; one médecin auxiliaire; three pharmaciens auxiliaires and 108 bearers. It has the following transport: One four-wheeled vehicle; eight two-wheeled vehicles; 30 wheeled stretcher carriers.

The system of working this unit is as follows:—

(1) *Poste de Secours.*—Detachments of the G.B.D. are, during battle, attached to the battalion aid-posts (Postes de Secours).
(2) *Relais de G.B.D.*—Within reasonable distance of the aid-posts is the relay post of Relais de G.B.D., which corresponds roughly to our bearer-posts.
(3) *Poste de Recueil.*—This corresponds roughly to our advanced dressing station, and is the point at which motor ambulance cars, horsed ambulance wagons, and wheeled stretchers are kept.
(4) *Poste Central G.B.D.*—This is the headquarters of the G.B.D., and is also the headquarters of the Section Sanitaire Automobile. At the headquarters of the G.B.D. there are the following: (1) Magasin de Material Anti-gas; (2) Laboratoire de Toxicologie; (3) Cabinet Dentaire; (4) Dépôt de Désinfectants.

Section Sanitaire Automobile "Ambulances."

This is the French analogue of our motor ambulance convoy. It consists of 20 motor ambulance cars and one touring car. Normally, each division has one section attached to it. In divisions these cars are usually attached to, and work with, the G.B.D. (see disposition above), but there are also some cars attached to the "distributing" ambulance—i.e., l'Ambulance de Triage. These cars evacuate cases as far back as the Hôpitaux d'évacuation. The section is commanded by a lieutenant of the French Automobile Service, and has no medical personnel. The S.S.A. are replaced in some cases by American formations, which are groups of 40 Ford cars, replacing the 20 Fiat ambulance cars of the ordinary French units. In case of an offensive the corps adds more S.S.A. for the whole corps front. In a French army consisting of two corps of two divisions, two divisions are in the line and two in reserve. This gives 50 ambulance cars to evacuate each divisional front.

In addition each army has one to four S.S.A. in reserve for disposal where necessary. One S.S.A. is allotted to each hospital of evacuation for the transfer of special cases, or for evacuating to other hospitals.

In the French army the term "ambulance" is employed in the sense of field hospital. The personnel of an ambulance is as follows:—

8 officers { 5 médecins (of which one is the médecin chef).
1 pharmacien.
2 officiers d'administration.
and 32 other ranks (infirmiers).

The strength of the rank and file roughly corresponds to one and a half "tent subdivisions" of a British field ambulance. The number of ambulances attached to a division varies according to its needs. There are usually two. They are moved about by the Directeur du Service de Santé du Corps d'Armée, but when with the division they are under the orders of the médecin divisionaire.

When not taken over and pooled under corps arrangements divisional ambulances are employed as follows: (1) One is the ambulance de triage, which distributes cases and also keeps cases not fit to travel, and lightly wounded who will quickly recover. It corresponds roughly to our divisional dressing station. (2) Another ambulance is used as a small hospital, corresponds to our divisional rest-station, and takes sick, lightly wounded, venereal and slight skin cases. There is accommodation for 150 patients, and the periods of their stay in the ambulance is usually limited to three weeks.

The Ambulance de Triage has attached to it a Groupe Complémentaire de Chirurgie (G.C.C.) which has no analogue in our service. Each of these groupes has as transport one lorry with a trailer which carries complete equipment for forming an advanced operating centre and radiological department. The material carried is sufficient for an operating-room, and anæsthetic room, and an X ray room. These rooms are lighted by electricity, and there is a complete plant for providing sterilised water and for heating the operating-theatre. On arrival at the unit to which it is attached the G.C.C. is worked by the surgical staff of the ambulance.

It will be seen that the médecin divisionaire has under his administration the Group des Brancardiers Divisionaires and the Section Sanitaire Automobile. The two ambulances and the G.C.C. may, and often are, pooled by the D.D.M.S. to form corps formations. Obviously his position is very different from that of a British A.D.M.S. The battalion medical officers and médecin chef du régiment are under the colonel of the regiment, and the médecin divisionaire exercises only technical supervision over the regimental medical establishments.

Evacuation of Wounded: "Infirmeries."

It is an axiom of the French Military Service that all wounded should be operated upon as soon as possible after their wounds, and to obtain the best results this should be within the first 12 hours. The system of evacuation aims at bringing the wounded man to the operating-table in the minimum of time. Picked up by the stretcher-bearers of the regiment, the man is carried:—

i. To the Poste de Secours, where he is attended to by the médecin or the médecin auxiliaire.
ii. From this point, at first by divisional stretcher-bearers and then by horsed or motor ambulance, he is taken to the Ambulance de Triage, where the dressing is inspected and his destination decided upon.
iii. If the wound is serious (head, abdominal, or thorax) and further transport is dangerous he is admitted into the Poste Chirurgical Avance (G.C.C.), which is near the Ambulance de Triage.
iv. If he can stand two or three hours' journey he is taken to the H.O.E. (hôpitaux d'évacuation, corresponding to our casualty clearing stations).

M. Garret puts the evacuation system very concisely, as follows:—

Poste de Secours.—Triage avec P.C.A.; puis H.O.E. voilà les trois organes essentiels du Service de Santé du champ de bataille, tel qu'il est actuellement compris. Le reste: Relais de G.B.D., poste de recueil, ambulances divisionaires, infirmeries, ne sont qu'accessoires.

In addition to the ambulance pour petites malades each French division usually organises infirmeries which have no official analogue in our Service. They provide for the treatment of very slight cases of illness quite close to the front line. The patients are not shown as admissions to any medical formation. The

establishment is the médecin chef of the regiment in reserve, assisted by a medical officer and the medical orderlies from battalions in reserve.

Burial of the Dead.

A striking difference between the French and British armies is the arrangement for burial of the dead. In the British army this is arranged for by the adjutant-general's branch, but in the French army the burial of the dead is in the hands of the medical service. The G.B.D. of a division is responsible for the carriage of dead from Relais de G.B.D. to the cemeteries in rear. Special vehicles for the dead are provided. The cemeteries of the forward area are under the charge of the G.B.D. The French display an immense amount of effort to do honour to their soldiers, "morts au champ d'honneur." Where practicable coffins are always provided. Their manufacture is in the hands of the Intendance, which corresponds to our Army Service Corps.

Pharmacy and Dentistry in the French Medical Service.

One of the most remarkable differences between the French Medical Service and our own is the very high position afforded to pharmacy. Whereas in our Service the dispensing of medicines is performed by corporals and sergeants, and the care of medical stores entrusted to our quartermasters, in the French army these duties are in the hands of a special body of officers, who hold the same rank as the medical officers. Important additional functions are also carried out by the pharmacien of the G.B.D. of each French division:—

(1) He acts as analytical chemist to the division and analyses and reports on all water supplies in the divisional area.

(2) In addition, he is not only the divisional gas officer, but has charge of all reserve supplies of masques and other defences against gas.

(3) He has charge of the divisional supply of disinfectants, which in our army is in the hands of the A.S.C.

In marked contrast to the high position held by pharmacy is the position accorded to dentistry by the French. The dentist is not an officer, but a sous-officier like the médecin auxiliaire. Each Groupe de Brancardiers Divisionaires has a dentist, and there is also a dentist for each regiment—i.e., three dentists per division. The general distribution of dentists is as follows:—

(A) *Armies.*—In front area formations: One dentist per Groupe des Brancardiers Divisionaires (divisional stretcher-bearers); one dentist per infantry regiment; one dentist per Groupe des Brancardiers du Corps (corps stretcher-bearers); one dentist per travelling dental centre.

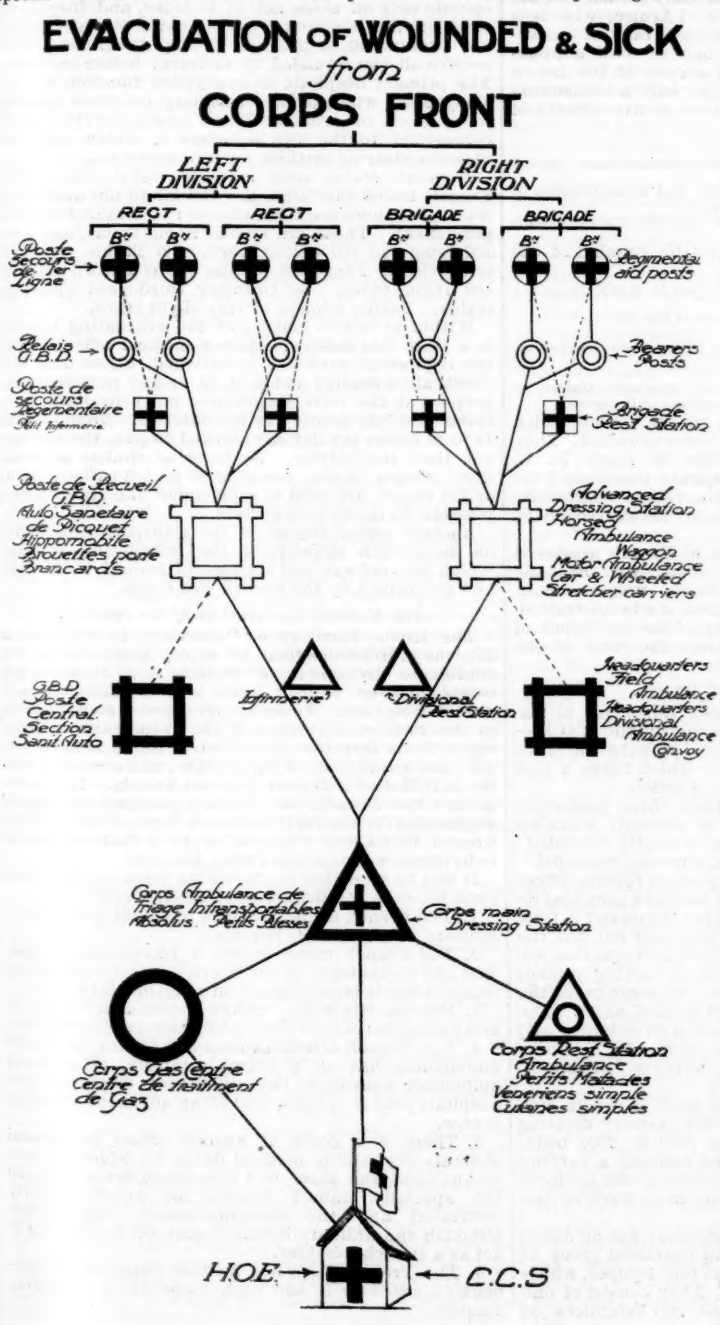
(B) *Lines of communication.*—One dentist in each Centre Hospitaliere (group of hospitals); one dentist in each Dépôt d'Eclopés (éclopés are very lightly wounded or sick).

(C) *Base.*—There is a dentist: (*a*) In each district where a dépôt of corps troops exists. He is attached to the military hospital, or failing this, to the most important medical formation in the area. (*b*) In each camp of instruction.

Military dentists are under the orders of the médecin chef of the formation to which they are attached.

The Medical Organisation of Corps, Armies, and Lines of Communication.

The medical organisation of a French corps is under the control of a Directeur du Service de Santé, who is a médecin principal de 1re classe. He corresponds to a British D.D.M.S. He has a staff officer, called adjoint, corresponding to a D.A.D.M.S. He has the following under his direct control.



(1) Groupe des Brancardiers de Corps d'Armée. These G.B.C., Groupe des Brancardiers de Corps d'Armée, are organised on exactly similar lines to the G.B.D., and employed as required by the corps d'armée. They constitute a corps reserve of stretcher-bearers.
(2) One S.S.A. de Corps d'Armée, and during active operations 20 lorries for lightly wounded.
(3) A varying number of ambulances allotted to him by the army.

Frequently the Directeur pools the whole of the divisional ambulances and arranges for the evacuation of all wounded to what corresponds to our corps main dressing station, a corps rest station, and a corps gas treatment centre. Each Directeur has on his staff a consulting surgeon.

The medical service of a French army is under a Chef Supérieur du Service de Santé de l'Armée, who is a médecin inspecteur with the relative rank of major-general. He has on his staff one or two adjoints (D.A.D.M.S.), who are médecin majors of the 1re or 2me classe, a consulting surgeon, and a consulting physician. In addition he has four or five officers of administration. Of these:—

(1) One officer deals with the personnel.
(2) The second deals with the verification of all accounts. He is a sort of local auditor.
(3) The third deals with the inspection and administration of formations, and their upkeep and material.
(4) The fourth forms the link with the état civil for deaths, burials, &c.

The chef supérieur controls a variable number of the following medical formations:—

(1) Ambulances, which are usually grouped in H.O.E. (hôpitaux d'évacuation).
(2) Reserve sections sanitaire automobile (M.A.C.'s).
(3) Équipes, or surgical teams.
(4) Automobiles chirurgicales (organised groups of surgical teams).
(5) H.O.E. (hospitals of evacuation).
(6) Special gas treatment hospitals.
(7) Special centres for: (*a*) eye; (*b*) ear, nose and throat; (*c*) venereal; (*d*) skin; (*e*) mouth and face surgery; (*f*) fractures.

Behind the zone of the armies are the étapes, which correspond roughly to our lines of communication. They are under a Directeur du Service de Santé D. E. The étapes include various hospitals established for surgical and medical work or for the various specialities of medicine or surgery. They also include the secondary hospitals of evacuation.

The medical service of a group of French armies is under a Médecin Inspecteur-Général, who has the following staff: One or two médecin majors 1re or 2me classe as adjoints; one officier d'administration. His functions are to carry out inspections on behalf of the Général en Chef and coördinate the work of the group of armies and the étapes.

B. *Service de Santé d'Arrière.*

Hôpitaux d'évacuation.—The first important formation of the service de santé *vers l'arrière* is the H.O.E.—by the way, the French are as fond of alphabetical titles for medical formations as we are—which forms a link between the two zones, d'avant et d'arrière.

The hospitals of evacuation have three important functions: (*a*) triage or sorting of seriously wounded from slight cases; (*b*) evacuation of lightly wounded; (*c*) hospitalisation or treatment of seriously wounded.

The H.O.E. is administered by a senior regular officer of the service de santé, usually a médecin principal de 1re classe. He has usually under his command a total of 34 officers, 10 nurses, and 250 rank and file, but the establishment is not fixed. Hôpitaux d'évacuation are composite formations built up from a varying number of ambulances and surgical teams. In some cases the teams are in groups of six, called surgical units. The surgical unit has a trained personnel of 80 orderlies and nurses, and can deal with 500 beds. M. Lemoine describes this unit as the "cheville ouvrière" of surgery at the front.

French hospitals of evacuation have grown in size during trench warfare, like our own casualty clearing stations, until they have reached 2000 to 3000 beds. They are arranged in sections and embrace a varying number of what is known as auto-chirs under médecin chefs, who are well-known surgeons from Paris or one of the great medical schools.

The auto-chir, or automobile-chirurgical, has no direct analogue in our Service. It is an organised group of surgical teams. Each auto-chir has four équipes, which are similar to our surgical teams. They consist of one chirurgien, one aide-chirurgien, and two infirmiers, of which one acts as an anæsthetist. There are usually with each équipe two infirmiers, supplied by one of the three societies forming the Croix Rouge Française—viz., La Société de Secours aux Blesses Militaires des Armées de Terre et Mer, L'Union des Femmes de France, and L'Association des Dames Françaises. The eight infirmiers of the auto-chir serve under an infirmiere major.

Hôpitaux d'évacuation have been recently divided into primaire and secondaire. There are two or three hôpitaux d'évacuation primaire for each army, but not at railheads. They function as clearing hospitals and operate only on cases not fit to leave, and they direct cases on the hôpitaux d'évacuation secondaire, which are situated 50 to 200 km. behind the lines. They receive all the wounded fit to travel before operation. The primary hospitals of evacuation function for one army only, whereas the secondary hospitals function for a group of armies. These arrangements roughly correspond to the two echelons in which our own casualty clearing stations are now arranged.

Hospital trains and railway rest-stations.—The French trains sanitaires are similar to our ambulance trains, but there are three classes: (1) Trains sanitaires permanent. These are similar to our trains, and carry 100 lying and 200 sitting cases. (2) Trains sanitaires improvises. These are similar to our T.A.T., and hold 100 lying cases. (3) Ordinary third-class passenger trains. Taking éclopés, or very slight cases.

Within an hour's journey of the evacuating hospital is a Gare Régulatrice. Here a medical officer, called the régulatrice sanitaire, is stationed, whose duty is to check all dressings and to hold up any patients in the hospital at the Gare Régulatrice not considered fit to travel the long journey to the interior. No more than 10 to 12 trains per day are allowed to pass through any one Gare Régulatrice. We have no similar organisation. Steam barges, carrying 80 to 100 patients lying or 124 mixed, are used to supplement the trains where possible, as in our own system.

Another special feature of the transport of wounded on the French railways is the Infirmeries de Gare, which are railway rest-stations of from 5 to 15 beds, and are formed by the French Red Cross.

The Medical Organisation of the Interior.

The Home Territory or "Interior" is organised in Régions d'Hôpitalisation, in which hospitals for the continuous treatment of wounds and sickness are established on similar lines to our stationary and general hospitals. There are 20 regions, corresponding to the 20 territorial corps of the French army. Each region has a Directeur du Service de Santé de la Région, who has an adjoint, or D.A.D.M.S., and corresponds to the A.D.M.S. of a district in Great Britain. In France, as in Great Britain, the military hospitals are largely augmented by auxiliary hospitals formed by the three French Red Cross Societies or by private bodies or individuals working under their auspices.

It will be seen that the following striking differences exist between the British and French services:—

1. The French medical officers have not got ordinary military titles as in our Service.

2. The French regiment has a regimental surgeon, who has no analogue in our Service, and the divisional organisation is largely based on a regimental system.

3. Pharmacists hold a rank and position in the French army unknown in ours, whereas dentists are sous-officiers.

4. The French division, instead of having three field ambulances has (*a*) a bearer company, (*b*) a motor ambulance convoy, (*c*) two ambulances which are field hospitals *purs et simples*, and (*d*) an advanced operating centre.

5. There is a grade of warrant officer for medical students performing medical duties for which we have no analogue, and there is a distinction drawn between the specially trained hospital or nursing orderly (infirmier) and the stretcher-bearer (brancardier), although the ordinary infirmier may be called upon to act as a stretcher-bearer.

6. The French Corps has medical formations permanently allotted to it, and each corps has a consulting surgeon.

7. The Medical Service of what corresponds to our L. of C. is under the Inspecteur du Service de Santé of a Group of Armies.

Attached is a diagrammatic plan showing the system of evacuation from a French corps front.

The following is a list of the chief French medical formations and the corresponding British equivalents:—

French.	*British.*
(1) Postes de Secours.	Regimental Aid-Post.
(2) Relais de G.B.D.	Bearer-Posts.
(3) Poste de Secours Régimentaire.	Brigade Rest-Station.
(4) Poste de Recueil (G.B.D.).	Advanced Dressing Station.
(5) Poste Central (G.B.D.).	Headquarters, Field Ambulance.
(6) S.S.A.	M.A.C.
(7) Ambulance de Triage.	Corps Dressing Station.
(8) Centre de Traitement de Gaz.	Corps Gas Centre.
(9) Ambulances pour Petits Malades.	Corps Rest-Stations.
(10) H.O.E. (Hôpitaux d'Évacuation).	(*a*) *Primaire.* Casualty Clearing Station. (*b*) *Secondaire.* Stationary Hospital.
(11) Infirmerie.	Regimental or Divisional Rest-Station.
(12) Dépôt d'Éclopés.	Army Rest-Station.
(13) Régulatrice Sanitaire.	Medical Officer supervising Ambulance Trains.

I have to thank M. le Médecin Inspecteur-Général Lemoine, C.B., lately of a Group of Armies, and now *en retraite* in Paris, M. le Médecin Inspecteur Lasnet, of the French Army of the Rhine, and M. le Médecin Major Garret for their valuable help and assistance in preparing these notes.

STATE CARE OF MENTAL DISORDER.

ANNUAL REPORT OF THE BOARD OF CONTROL (LUNACY AND MENTAL DEFICIENCY) FOR 1919.

THE sixth annual report of the Board of Control, covering the year 1919, has been issued, and can be purchased from H.M. Stationery Office for the modest sum of 1*s*., an appendix which contains statistical tables and other details costing 9*s*. The report, as usual, is of great interest to medical practitioners, and deserves a much wider circulation than it generally obtains. There is this year welcome evidence of a more liberal spirit and, notably in one direction, of greater interest taken in the medical staff of the mental hospitals. The Board, moreover, has made six grants, amounting in all to £1500, for scientific research, showing that a beginning has been made by the State in seriously investigating the problems of insanity and mental deficiency. There can be no better use for public money than in the support of study of this kind. Not only does it mean a reduction of human suffering, but in the long run will prove a sound investment through the reduction in the cost to the community of the maintenance of the defective and mentally infirm.

Constitution of the Board.

The Board consists of 12 persons, two of whom are women, and the chairman is Sir W. P. Byrne. There are also two inspectors, whose duties are chiefly concerned with the supervision of mental defectives. The number of insane was (Jan. 1st, 1920) 116,764, an increase of 61 on the previous year. There were also 10,129 mental defectives, an increase of 1443 over the previous year. It may be calculated by a simple division sum that each member of the Board has on an average about 10,000 mentally infirm persons to "control." It is evident that a great deal is asked of the Commissioners, and the question arises whether some new arrangement is not overdue.

The actual exertion of personal control by members of the Board as regards the county and borough mental hospitals is limited to a single visit each year, when a hospital of about 800 or possibly 1000 patients is inspected in six hours by two Commissioners. A written report is made, and it is perhaps not surprising that local authorities do not always give as much weight to the Commissioners' findings as their special experience and authority should demand. Indeed, it may be feared that the Board of Control does not exercise the influence it used to do in asylum administration. The Board indeed admits as much, when it notes that it was not informed or consulted when far-reaching negotiations were arranged dealing with the hours and salaries of asylums officers.

The Need for a Central Authority.

Yet there is abundant evidence that a strong central authority is necessary. On the one hand, there is no reason to believe that human nature has so altered as to render supervision and inspection less needful in 1920 than it was in 1845 when the Commission in Lunacy was instituted. Truly horrible abuses prevailed until Lord Shaftesbury and the new Commissioners swept them away. The present report contains evidence that thoughtlessness, and even worse, still obtains, as we find that in two instances the Commissioners prosecuted nurses for assaulting patients, leading to conviction, and it may be assumed they would not have done this had not the local authority neglected its duty in the matter. But in the interest of the patients' health and recovery it is of the utmost importance that they should not be left entirely to the care of local authorities. No doubt some are up-to-date and encourage their medical officers to do everything possible to promote the well-being of the patients; but, unfortunately, others are indifferent, if not reactionary, and all are fearful of expense. So the medical officer fights single-handed for his patients' welfare, and only too frequently he loses heart and becomes discouraged. The temptation to become an economical administrator and to neglect medical science only too easily overwhelms him, the more so as his success is measured by his Committee rather by the relative lowness of the cost of maintenance than by his scientific attainments or his medical skill.

Legal and Official Difficulties.

It is often forgotten by those who criticise the Board of Control that it has to administer an Act of Parliament for which none of its present members were responsible, and which urgently demands amendment. Judges and Commissioners must not be blamed if the law is out of date, nor must they be asked to ignore the written statute. Many of the routine duties of the Board involve a burden that the public hardly realise. We believe it is still the practice for a member of the Board personally to read every medical certificate sent in, including every report made by medical officers relating to patients. Excluding mental deficiency 22,891 new patients were admitted during 1919 and 119,478 were in residence at the beginning of the year. When one thinks of the new certificates required, the constant stream of special reports for those under care, the weekly, monthly, yearly reports required by law, the death certificates, and that one or other of the Commissioners is expected to satisfy himself that these are all in order, it is evident the Board has no easy post.

The Board's history is interesting. From 1846 until six years ago the Commissioners in Lunacy were an independent body, appointed by the Lord Chancellor and reporting to him. The Chancellor represented the King, to whom all lunatics looked for protection. When the Board of Control was established it reported to the Home Secretary. The introduction of the word control emphasised its legal controlling power. The Prison Commissioners also report to the Home Office. Now, happily, the transfer to the Ministry of Health is completed and we may hope that less attention will be given to control and more to treatment and prevention. The problem is one of extreme difficulty, for safeguards are necessary directly an individual becomes mentally afflicted. We hope it may be possible to divorce these necessary safeguards more completely from the medical duties of the central authority. We have a vision of a new Board concerned with cure more than control, with research more than restraint, and with prevention rather than prosecution; a Board whose duties include the provision of early treatment of mental disorders, as well as the custodial care of confirmed cases; a Board which stimulates intensive study of the causes of mental infirmity; and further than this a Board whose members are

able to give the time necessary to assist medical officers everywhere in their efforts for their patients, lending them a helping hand in the lonely uphill struggle which many of them are undertaking.

Relation of Commissioners to Medical Service.

At present, alas, the Visiting Commissioners can rarely spend any time in the consideration of a difficult case, except in so far as to decide whether detention is justified. We see in this report little indication of any advice on methods of treatment, and yet with their unrivalled experience for visiting the hospitals throughout the kingdom none should be more qualified than they to give it. There is, however, from the medical officer's point of view one most encouraging feature. The Board took a great step forward when it sent the circular letter to Visiting Committees pointing out the glaring defects in the conditions of medical service, and urging the importance of facilities for marriage, the necessity for post-graduate training in psychiatry, and the desirability of study leave for all junior medical officers.

Not many years ago the Commissioners objected to the medical superintendent having a detached house; now they definitely recommend that medical officers should be encouraged to marry and live near, but not necessarily inside, the asylum precincts. They point out that no medical man can properly treat more than 50 recent cases, and that it is necessary for the work to be so arranged and the number of the medical staff so increased that treatment may be effectively carried out upon modern lines. The letter well illustrates how a central authority can enlighten and stimulate Visiting Committees in respect to duties that may easily be overlooked. We believe we shall be right in suggesting that the letter would have more effect if the Visiting Committees themselves took more interest in the junior medical officers, especially if on their visits they personally examined the staff quarters and discussed with the officers the problems arising in their daily work. The practice of recognising the medical superintendent only and placing all responsibility upon him is not good for the superintendent and stultifies the position of the juniors. It has far too long been the practice of the medical superintendent to plough a lonely furrow, and this ought not to be encouraged by Visiting Committees. The medical staff in a mental hospital should consist of colleagues who share with one another the responsibilities of the work.

Asylum Mortality During the War.

The mortality figures published by the Board are not pleasant reading. Before the war the average death-rate per 100 patients in residence was 9·6, during the war it steadily increased until in 1918 it was 20·3, and in 1919 it had begun to fall, but was still 12·9. These are the figures for the county and borough asylums; the mortality in the registered hospitals which receive private patients only was much less, and what is more remarkable it showed little or no increase during the years 1915–18.

There is, unfortunately, no escape from the conclusion that the pauper insane suffered privation during the war to a degree that is not creditable to our civilisation. The causes of death were reported to be chiefly tuberculosis, influenza, and dysentery, but there is reason to fear that these were but terminal infections, and would, for the most part, never have occurred had the conditions been satisfactory. The facts have not been set out as such, but they can be inferred from the study of the statistical returns as a whole and the individual reports of medical superintendents. It is doubtful how far it is now desirable to discuss this painful subject, seeing that war must bring misery in its train and that armies must be fed, whether invalids have sufficient or no. During those terrible years the conditions in our hospitals for the insane differed only in degree from those which obtained in Vienna and other Central European cities as a result of the blockade. It is devoutly to be hoped that there will be no further occasion for strict food control, but if there be let us hope that there will never again be a mortality in our asylums of nearly 20 per cent. These deaths occurred in the sick and mentally infirm who look to the State for protection.

The explanation is twofold. The public hospitals for the insane were overcrowded through the conversion of 17 asylums into war hospitals of various kinds. Had it not been for the heavy death-rate it would have been impossible to have done so much in this direction, and the cynical spectator of our recent history might say that provision was made for sick soldiers by killing off the insane. But the chief reason for the mortality lay in the dietary restrictions. The Board of Control, actuated, no doubt, by the best of motives, issued circular after circular directing that food-supplies must be cut down. In the large asylums expensive substitutes were not forthcoming, and consequently they suffered much more than hospitals receiving private patients. It was not, however, only lack of food which proved so serious, but the lack of the essential accessory food factors, due to withdrawal of butter, cheese, fresh milk, and the supply of margarine, condensed milk, and tinned meats. We know now more of the importance of vitamines, and probably a restrictive diet could be devised which would be much less dangerous.

If it be said that nothing could have prevented the serious epidemic of influenza, which, as we know, carried off so many of the young and healthy in 1918, it should be pointed out that the asylum death-rate had already reached 17 per cent. in 1917. Besides, there is room for an uncomfortable scepticism about the diagnosis of influenza. Physicians in this country are, happily, not familiar with the symptoms of hunger œdema and other disorders produced by lack of essential food factors. There is reason to fear that dysentery, which is still so common in our public asylums and is unknown in institutions receiving private patients, may depend, in part at any rate, on the lack of certain vitamines. In 1919 1722 patients were treated for dysentery, apart from a further 1041 who suffered from diarrhœa. Of these 384 died. There is room for research here, as evidence is accumulating that the problem is not merely one of infection and efficient segregation.

Mental Nursing.

Reference has already been made to the fact that the Board of Control was not consulted during the negotiations between the Mental Hospitals Association and the Asylum Workers' Union which led to a drastic reduction of hours and greatly increased pay of the staff. It is probably undesirable that the Board should be asked to take up matters such as this, which are economic rather than medical, yet there is a third party to this issue which appears to have been ignored throughout the discussions that have taken place. The patients' welfare should be a direct concern of the Board, and there is good ground for the remark that it will "watch with some anxiety the result of these changes." It is not to the interest of patients to be nursed by an overwrought man or woman, nor is it to their interest that the hours of nursing duty shall be so short that the nurse has no time to get to know them, while constant change of nurse gives little opportunity for continuity of treatment. The reduction of hours urgently needed in the anxious duty of caring for a violent or suicidal patient now applies equally to the time spent in going for country walks and joining in games and dances. The schedule makes no differentiation between the nature of the duties. It is doubtful whether the changes which have involved such heavy expense through increase in the staff and provision of accommodation for the extra nurses is as beneficial to the nurses as was expected, whilst there is reason to fear that the change has been other than beneficial to patients. It is too soon as yet to form a final opinion on the matter.

The report itself contains little or no allusion to the nurses beyond a paragraph welcoming the Nurses' Registration Act, and another referring to the prosecutions already mentioned. The welfare of the insane is so intimately bound up with the men and women who minister to their wants and with whom they live that we hope the Board takes more interest than it appears to do in the training of nurses, in the conditions of their work, and in their emoluments. Mental nurses perform

a service to the community which is rarely, if ever, recognised or properly valued. Relatives, visitors, committees, and, we fear, Commissioners trouble little about them, yet for devoted work under arduous and difficult conditions few workers can compare with them. In the past they have been miserably paid, and those of them who occupy responsible positions still do not receive remuneration corresponding to the value of their services to society. It is therefore not surprising that everywhere there is a shortage of nurses of the right stamp.

The Number of Insane.

The report does not afford material for the discussion of the ever green topic whether or no insanity is increasing. The subject is a barren one, for insanity is not a disease, but the term includes a large number of physical and mental disorders which have but one thing in common, that the patient is unbalanced in mind and can no longer adapt himself to social requirements. The number of new admissions during 1919 was 847 more than in the previous year, and there was a net increase of 474 in number under care. The recovery rate, calculated upon the total admissions, was 31 per cent. in the county and borough asylums, 44 per cent. in the hospitals, and 33 per cent. in the licensed houses.

From the year 1915 to 1918 there was a steady decline in the number of patients admitted in whom alcohol was considered to be the principal contributory factor in the production of the insanity. Speaking of the men only, the percentage in successive years was 17·2, 17·5, 13·3, 9·6, but in 1919 the percentage increased to 11·7. The figures are part of the cumulative evidence in favour of State control of the liquor traffic, although they do not justify the conclusion that mental illness was prevented in the same proportion, as some of the persons who did not succumb to alcoholic indulgence probably broke down from other causes.

There is much in this important report which deserves careful study besides the matters on which we have here laid emphasis.

IRELAND.

(FROM OUR OWN CORRESPONDENT.)

Government Grants for Health Services.

THE Irish Public Health Council at its meeting last week went carefully into the question of the stoppage of State grants for health services in Ireland, and decided to represent to the Government the advisability of continuing these grants. The same day the Council waited on the Chief Secretary and placed before him the serious consequences to the health of the community that would be entailed if the grants for health services were stopped. Particular stress was laid on the necessity for continuing the grant for tuberculosis and other special diseases, and also for child welfare, and the Chief Secretary undertook that the recommendations would be carefully considered by the Government. The line adopted by the Council was that health services should be held sacred, and that no political considerations should be permitted to interfere with services designed to relieve and prevent sickness. This is a high and dignified attitude for a body specially interested in health to adopt. I am informed that the action taken by the Council was unanimous, a fact of some significance when it is recalled that about half the members of the Council are officials of the Government.

Voluntary Hospitals.

At the same meeting the Irish Public Health Council had under consideration the question of voluntary hospital finance in the larger cities of Ireland. It being understood that the Committee of the National Relief Fund contemplate allocating a sum of £700,000 for voluntary hospitals in the United Kingdom, the Council decided to urge the Irish Government to press for a substantial share for Ireland, and to recommend that the question of the allocation of such share amongst the various institutions in this country should be most carefully considered, having regard to the circumstances of each hospital. Ireland's share of this distribution should help to satisfy the immediate needs of the hospitals. The Council would then be free to consider broader questions concerning the future of the hospitals. The chairman reported that he had secured from the Medical Research Council 412 mg. of radium bromide (value £8000 to £10,000) for the purpose of medical research and the treatment of disease. A committee was appointed to draw up the conditions under which the radium should be made available.

Sept. 27th.

Public Health.

SCHOOL MEDICAL SERVICE.

Stockport.

THE school population in Stockport is 18,866 and 8502 children in the three code groups were examined. Of these 3304, or 39·4 per cent., were found to be suffering from defects, as compared with 45 per cent. in 1918. These figures do not include verminous conditions, which existed in 12·8 per cent. of the children, as compared with 23·4 per cent. in 1917. Dr. H. E. Corbin, the school medical officer, deplores the fact that there are still many parents and children who are quite indifferent as to whether their heads are clean or not. The method employed at Stockport to deal with uncleanliness in a school involves much time and trouble. A series of visits is paid by the nurse at six weekly intervals. At each visit the clean are eliminated, and in very few schools are the six visits not required. In fact, in the poorer districts extra visits have to be made. It is suggested that a rule should be made that every girl should come to school with her hair either cut short or tied back, also that, having regard to the number of cases which recur over and over again, sterner methods should be taken with the parents to enforce cleanliness.

It is unfortunate that, owing to the entire lack of any definite standard of cleanliness such as could easily be laid down and adhered to, it is impossible to make a comparative study of the prevalence of verminous conditions in different areas. Only by getting statistical uniformity and then comparing the methods of dealing with the conditions found can we arrive at a solution of the very urgent problem of how to deal with uncleanliness in school children. The figures given in school medical reports under the headings of uncleanliness, very often coupling boys and girls together, are valueless and misleading from a statistical or, indeed, from any point of view.

A development in remedial work is the tuition established for stammering children. Two classes consisting of 12 children each were held for six weeks, with the result that 16 out of the 24 were pronounced cured, 7 improved, and 1 remained stationary. Neither the ages of the children nor the proportion of boys and girls is mentioned in the report. As relapses are not infrequent the children are followed up carefully, and an open class is held on Saturday morning for discharged pupils who care to attend. This year an additional class on one half day during the week is being held for these old cases.

Glasgow.

The twelfth report of the Glasgow Authority and the tenth report of the Govan Authority on medical inspection are interesting as being the last separate reports of these authorities, now merged into one. Glasgow furnishes the merest apology of a report, strangely out of perspective. Two pages of almost valueless statistics of heights and weights are followed by the mention of visual examination by the oculist of 11,212 infants; and the only further information we get on this almost pioneer work is that 815 cards were issued! With a roll of 132,000 in 139 schools, Glasgow had 1328 medical visits, whilst Govan with 43,000 roll in 41 schools had 875 medical visits and 318 special school visits. The nature of some of this special work is shown. For instance, Glasgow returns about one-twentieth the usual

proportion of stammerers and Govan records only 7 stammerers out of 17,000 children examined.

Dr. Arbuckle Brown devotes several pages to comparisons of average heights and weights, but although described as an exhaustive and careful analysis the data have not been evaluated beyond rough averages, and the trivial changes scarcely possess the importance attached to them. During exactly the same period Porter showed in the Boston schools a difference in weight of several pounds according to the distribution of such records by months of age or by calendar months. The consideration of seasonal variations is most important, and considerable discrimination beyond rough averages is required.

Nottingham.

In his report to the Nottingham Education Committee Dr. E. M. Wyche draws attention to the great value of open-air education in combating the adverse effects of town-dwelling in early life and outlines an interesting development in open-air instruction. At present the city possesses the Arboretum Open-air Recovery School, which, although only a temporary structure, has been very successful. Of the 70 children discharged in 1919, 29 were cured, 12 very much improved, 8 had no substantial improvement, and 4 developed signs of active pulmonary tuberculosis. These 70 children were suffering from 190 defects, including, amongst others, 42 cases of malnutrition, 35 of anæmia, 22 of non-tuberculous lung disease, 3 of tuberculosis of the lung (arrested), and 10 of surgical tuberculosis. It would be interesting to know under which heading the four unfortunate children who developed active pulmonary tuberculosis were originally scheduled.

In addition to the Arboretum Recovery School the committee have opened eight other branch recovery schools, which the children attend daily. A mid-day meal is provided. Having regard to the satisfactory results, the Committee propose increasing the accommodation which at present provides for just over 400 pupils. This is a development which will be followed with interest by other education authorities.

Kent.

In the annual report to the Kent Education Committee Dr. A. Greenwood suggests that provision of suitable educational facilities for blind, deaf, and physically and mentally defective children could be more economically effected by a combined area or even by a national scheme. It is time that further efforts in this direction were made. A large combined area scheme would not be very difficult of administration and would certainly be more economical. Indeed, having regard to the small and scattered numbers of children to be dealt with by many educational authorities, a separate scheme for each is out of the question.

The division of Kent for administrative purposes into 26 nursing areas is a step in the right direction. In each of these areas, in addition to her other public health duties, the nurse will have charge of the school work, thus linking up in each area all nursing activities connected with prevention of disease. This administrative method, which has been in force in Buckinghamshire for some years with excellent results, has decided advantages.

URBAN VITAL STATISTICS.

(Week ended Sept. 25th, 1920.)

English and Welsh Towns.—In the 96 English and Welsh towns, with an aggregate civil population estimated at nearly 18 million persons, the annual rate of mortality, which had been 10·0, 10·3, and 10·2 in the three preceding weeks, rose to 10·7 per 1000. In London, with a population of nearly 4½ million persons, the annual death-rate was 9·9, against 9·8 per 1000 in the previous week, while among the remaining towns the rates ranged from 4·4 in Wimbledon, 4·7 in Carlisle, and 5·1 in Reading, to 17·5 in West Hartlepool, 17·6 in Middlesbrough, and 18·2 in Barnsley. The principal epidemic diseases caused 294 deaths, which corresponded to an annual rate of 0·9 per 1000, and comprised 205 from infantile diarrhœa, 46 from diphtheria, 16 from whooping-cough, 14 from scarlet fever, 8 from measles, and 5 from enteric fever. The deaths from diarrhœa, which had been 171, 171, and 182 in the three preceding weeks, further rose to 205, and included 39 in London, 13 in Liverpool, 12 in Sheffield, 11 in Nottingham, and 9 in Hull. There were 3305 cases of scarlet fever and 1700 of diphtheria under treatment in the Metropolitan Asylums Hospitals and the London Fever Hospital, against 2953 and 1591 respectively at the end of the previous week. The causes of 30 of the 3653 deaths in the 96 towns were uncertified, of which 11 were registered in Birmingham, 3 in Manchester, and 2 each Liverpool and Blackpool.

Scotch Towns.—In the 16 largest Scotch towns, with an aggregate population estimated at nearly 2¼ million persons, the annual rate of mortality, which had been 9·8, 11·2, and 11·3 in the three preceding weeks, further rose to 12·4 per 1000. The 278 deaths in Glasgow corresponded to an annual rate of 13·0 per 1000, and included 12 from infantile diarrhœa, 3 each from diphtheria and whooping-cough, 2 from enteric fever, and 1 each from small-pox, measles, and scarlet fever. The 64 deaths in Edinburgh were equal to a rate of 9·8 per 1000, and included a fatal case each of diphtheria and infantile diarrhœa.

Irish Towns.—The 125 deaths in Dublin corresponded to an annual rate of 15·7, or 2·3 per 1000 above that recorded in the previous week, and included 22 from infantile diarrhœa, 3 from whooping-cough, and 1 each from enteric fever and diphtheria. The 122 deaths in Belfast were equal to a rate of 15·4 per 1000, and included 15 from infantile diarrhœa, 2 each from enteric fever, whooping-cough and diphtheria, and 1 from scarlet fever.

Obituary.

RICHARD DAVY, M.D., F.R.C.S. ENG., F.R.S.E.,

CONSULTING SURGEON, WESTMINSTER HOSPITAL.

Mr. Richard Davy, whose death occurred on Sept. 25th at his rural estate at Bow, North Devon, was the son of a medical man long in practice at Chulmleigh. He entered at Guy's Hospital in 1858 and worked under Hilton and Bryant, going on to Edinburgh in 1862, where he followed the clinics of Syme and Lister. He was a clinical clerk under Hughes Bennett and Laycock. The anatomical teaching of Turner greatly attracted him. He graduated in 1862 with second-class honours for his thesis on "Clinical Reports upon Certain Forms of Cerebral Disease." His interest in the profession was distinctly surgical. He spent the winter of 1863 in Paris, working at anatomy and practical surgery with some of his Edinburgh friends, including John Duncan, who afterwards became a leading surgeon in the Edinburgh School. Next year he settled in London and became surgeon to the St. Marylebone General Dispensary, and was subsequently appointed to the Westminster Hospital as assistant surgeon. Here he did excellent work as a teacher and original thinker. He published a book on "Clinical Surgery" in 1880. In his practice and teaching he was never conventional, but sternly honest and exact, and took his own line in perfect independence. He introduced several new methods of treatment and various instruments, but never adopted Listerian practice. In private he was the best of friends, a rather dangerous mimic, and in his dress and manner singularly independent of worldly conventions. He loved the country, and spent his holidays in sport in his beloved North Devon, where he became, on his father's death, a proprietor of many agricultural acres. At home he was truly *bonus comes*. He married on settling in London, and leaves two daughters; one, trained as a nurse in St. Thomas's Hospital, now married and a mother with one son. On leaving London he resigned all professional work and engaged in various parochial interests. He gradually became blind before his death in his eighty-second year. His funeral took place at Chulmleigh on Sept. 28th.

One of his junior colleagues writes:

Mr. Davy, who resigned the post of surgeon to the Westminster Hospital 27 years ago, while belonging to the pre-antiseptic period was gifted on the mechanical side of surgery, and will be remembered for his quaint phraseology. The Devonshire dialect, with some Scotticisms brought from Edinburgh, interspersed with metaphors from farming and everyday life, were used to impress his surgical opinions upon the students at the Westminster Hospital. Conversely, surgical metaphors were freely employed when he was expounding his political opinions, witness his lecture "On the Surgical Aspect of our Present Mode of Railway Travelling." Davy followed Spence in his antagonism

to Listerism. To him infections were the result of diatheses; if the patient was possessed by the septic diathesis, so much the worse for the patient. It was a matter outside of the purview of the surgeon. His mechanical genius found scope in connexion with the Surgical Aid Society. He was an exponent of the removal of the bones of the tarsus for deformities of the foot and of the excision of the knee- and hip-joints. His own patients were commonly treated without dressings, a notable improvement on linseed poultices and lint wetted with tap-water. Davy attended the International Medical Congress in New York in 1876, when he met Sayre, and on his return gave much attention to spinal caries, adopting Seydel's hammock when applying plaster jackets. His "Surgical Lectures," published in 1880, mark the end of a period in surgery which is now hardly more than a memory.

The Services.

ROYAL ARMY MEDICAL CORPS.

Lieut.-Col. E. S. Clark is placed on retired pay.

Majors A. J. Williamson and E. T. Potts relinquish the acting rank of Lieutenant-Colonel.

Capt. and Brevet Major W. L. Webster and Temp. Capts. F. P. Young and G. W. B. Waters relinquish the acting rank of Major.

Capt. K. P. MacKenzie is restored to the establishment.

R. B. Jenkins, late Captain, Can. A.M.C., to be temporary Captain.

Temp. Capt. R. Johnson to be Captain.

Captains, late R.A.M.C., Spec. Res., to be Lieutenants, and to be temporary Captains: J. S. B. Forbes, W. C. MacKinnon.

Officers relinquishing their commissions:—Temp. Lieut.-Col. W. Murray (Lieut.-Col., R.F.A., T.F.). Temp. Major R. H. Nicholson (retains the rank of Major). Temp. Capt. F. R. Kirkham (granted the rank of Major). Temporary Captains retaining the rank of Captain: T. H. Heywood, J. C. Robertson, W. M. Howells, J. L. Rubidge, R. L. Brown.

TERRITORIAL FORCE.

Major E. J. T. Cory to be Deputy Assistant Director of Medical Services, 1st London Division.

Major G. H. L. Hammerton to be Lieutenant-Colonel and to command 5th (Yorks) Cavalry Field Ambulance.

Capt. E. M. Cowell to be Lieutenant-Colonel and to command 1st Eastern Casualty Clearing Station.

Capt. C. M. Kennedy to be Lieutenant-Colonel and to command 2nd Wessex Field Ambulance.

Major (acting Lieut.-Col.) H. H. B. Cunningham relinquishes the acting rank of Lieutenant-Colonel on ceasing to be specially employed.

Major C. M. Kennedy (late temporary Captain, R.A.M.C.) to be Captain and to relinquish the rank of Major.

Major C. V. Bulstrode, T.D. (from R.H. and R.F.A.), to be Major.

Major J. B. Yeoman resigns his commission and is granted the rank of Lieutenant-Colonel.

Capts. (acting Majors) T. W. S. Paterson, E. L. Forward, H. J. D. Smythe relinquish the acting rank of Major on ceasing to be specially employed.

Captains to be Majors: (Bt. Major) J. Ewing, A. M. Hughes, F. Coleman, W. F. Mackenzie, J. H. Thompson, R. S. Taylor, H. M. Fort, A. P. H. Simpson.

To be Captains: Capts. J. H. Thompson, W. H. Kiep, W. W. Hallchurch, J. D. C. Swan (late temporary Captains, R.A.M.C.), A. Morris (from T.F. Res.), E. M. Cowell (late R.A.M.C., Spec. Res.).

Capts. J. M. Stalker, J. W. Macfarlane, B. Kelly, R. Ward (late temporary Captains, R.A.M.C.) to be Lieutenants and to relinquish the rank of Captain.

Capts. F. T. Boucher, H. E. Quick, and C. T. Matthews resign their commissions and retain the rank of Captain.

Capt. J. M. Heron relinquishes his commission and retains the rank of Captain.

Lieut. J. M. Stalker to be Captain.

TERRITORIAL FORCE RESERVE.

Major R. S. Taylor, from 1st West Lancs. Field Ambulance, to be Lieutenant-Colonel.

THE HONOURS LIST.

The following awards to medical officers for distinguished service in the field with the Waziristan Force in India are announced:—

Bar to the Distinguished Service Order.—Capt. N. S. Jatar, D.S.O., I.M.S., "for gallantry near Kotkai on Jan. 5th, 1920, when, during a withdrawal under heavy fire, he rendered valuable assistance in bringing in wounded, and, whilst doing so, was himself severely wounded."

Military Cross.—Temp. Capt. N. M. P. Dotivala, I.M.S., "for most conspicuous gallantry in action at Sorarogha on Jan. 18th, 1920, and at Makin on Feb. 20th, 1920. On both occasions he displayed the greatest gallantry and disregard for danger in his care of the wounded during the action. He set a very fine example to all."

DEATHS IN THE SERVICES.

Lieut.-Col. John Lewtas (late I.M.S., Bengal), whose death at the age of 69 took place in London on Sept. 23rd, was the son of a Liverpool doctor. Educated at Liverpool College, Edinburgh University, St. Thomas's Hospital Medical School, and at Paris, he entered the I.M.S. in 1875, and served in the Afghan campaigns of 1878-79 and 1880 (mentioned in despatches, and medal with two clasps). He became successively Civil Surgeon of Simla, Chittagong, and Darjeeling, and subsequently surgeon to the Medical College and Mayo Hospital in Calcutta and professor of ophthalmology in the Calcutta University. Colonel Lewtas, who retired in 1905, occupied during the war the post of Commissioner of Medical Services in the Ministry of National Service.

Correspondence.

"Audi alteram partem."

THE PELLAGRA OUTBREAK IN EGYPT.

To the Editor of THE LANCET.

SIR,—My absence from England and the exigencies of travel have prevented an immediate reply to Dr. J. I. Enright's article on pellagra in your issue of May 8th. The majority of the points that arise from this article have, in the meanwhile, been very ably dealt with in the criticisms of Dr. James Goldberger[1] and Professor P. S. Lelean.[2] This makes it unnecessary for me to do more than draw attention to facts in regard to these cases which came to my personal knowledge at the time. I wish also to draw attention to certain aspects of the problem upon which sufficient stress has not so far been laid.

Dr. Enright bases his whole argument on the assumption that the German prisoners all received the high value diet mentioned by Boyd and Lelean[3] in their report. Some of them may have done so at the Meadi Camp up till the end of November, 1918, to which place and date Professor Lelean's figures refer. All of them did not do so. In April or May, 1919, I visited the German Prisoners of War Camp at Heliopolis with the M.O. and the camp commandant, who was good enough to allow me to interview personally and separately 29 convalescents who, after recovering from pellagra, had been transferred there from the hospital; they all stated that at no time since their capture had they had enough money with which to purchase supplies from the canteen, and this was stated also by the majority of a number of other prisoners who were interrogated; the commandant of the camp believed that their statements were probably true. The maximum diet these men had was thus almost certainly as laid down in the ration sheet, being of an estimated value as follows: gross protein, 92; biological value of protein, 58; calories, 2087.

In evidence given before Colonel Wickerman's Committee, which was convened towards the end of September, 1918, to consider what modifications should be introduced into the prisoners' rations (Turkish) in view of the pellagra outbreak, upon which were Dr. R. G. White, Professor H. E. Roaf, Colonel Wickerman, and myself, it was stated in evidence that owing to the A.S.C. regulations alternatives could not be issued if foodstuffs included in the rations were not procurable; deficiencies of some importance in the rations issued had resulted; recommendations were made to remove this source of loss which, I believe, came into force in December, 1918. There can be little doubt that an unknown deficiency in the camp diet which must have reduced it considerably in caloric value affected the German prisoners as well as the Turkish. The estimated value of the rations is as issued from store; indefinite loss occurs in transit, preparation, and issue which must have further reduced the ration. Experimental evidence is given by K. Thomas[4] to show that an energy intake below the requirements raises the minimum requirement of protein. The same author also shows that illness raises the minimum protein requirement as estimated on the basis of the biological value of the protein above the normal, and that a higher level of protein intake is needed by persons recovering from a malady than under normal conditions of health.

None of Dr. Enright's cases can be considered normal; 62 out of 65 had suffered from dysentery and chronic diarrhœa and a large number from malaria as well, apart from 2 with scurvy; many were so suffering on admission to the hospital. I discussed more than once with Dr. Enright the importance of intestinal disease in increasing the liability to the effects of a deficient diet or even producing a secondary protein deficiency without an actual lack of protein in the diet when the amount is near the border-line. In addition the O.C. of the Prisoners of War Hospital mentioned to me how difficult it was to prevent the patients

with poor appetites passing on to others a considerable part of their ration; this supports Dr. Goldberger's contention. Apart altogether from conditions of health, the great difference in individual requirements is not sufficiently recognised. Sherman [5] gives a table showing the results obtained by a large number of observers in 109 experiments carried out on 75 different individuals. The minimum protein requirement varied from 21 to as much as 65 with an average of 45 g. daily. It must be remembered in this connexion that Dr. Enright's cases formed less than 1 per cent. of the camp population, 65 out of 7000 men.

In the series of diets I have collected [6 7] in which the biological value of protein, on the basis of K. Thomas's figures, has been used as the criterion of sufficiency the incidence of pellagra follows closely the fall in the biological value. In the Armenian refugee epidemic a diet, having a biological value equal to about 22 g. of caseinogen, the incidence of pellagra was 20 per cent. In Goldberger and Wheeler's experiments [8] the biological value, estimated from their figures, was 14·5 and the incidence certainly 63 per cent., possibly 100 per cent. Although I have taken the figure 40 as representing the biological value of the food protein below which pellagra may be expected to appear, it need not cause surprise if a few individuals contract the disease on a diet of higher value, just as with a diet at far lower value large numbers escape. The assumption of a special susceptibility, a pellagrous diathesis, is quite unnecessary; the units of no human community are uniform either in regard to their protein requirements or in other respects. It is almost certain that uniformity is a much less marked human character than it is in the lower animals usually made the subjects of dietetic experiments.

It would be a bold thing to say at present that pellagra is caused by nothing but a lack of the correct mixture of amino-acids in the diet. There is, however, no reasonable ground for supposing that a disease cannot be caused by a deficiency of protein, just as it is known that certain diseases are caused by a deficiency of one or other of the vitamines or internal secretions. A sufficiency of certain amino-acids is necessary for the building up of the cell protoplasm, just as other accessory substances are necessary, probably in the process of assimilation by the cells, but it cannot be said that the former factor is of less importance than the latter.

The conclusions to be drawn from what I have said are: (*a*) that the majority of the German prisoners of war in Egypt lived solely on the camp rations; (*b*) that the value of the rations was probably less as issued than the estimated value; (*c*) that those who contracted pellagra were not in normal health and that their protein requirement was raised thereby; (*d*) that the protein requirement was raised by the deficient energy value of the diet.

References.—1. J. Goldberger: THE LANCET, July 3rd, 1920, p. 41. 2. Lieutenant-Colonel Lelean: THE LANCET, July 17th, 1920, p. 156. 3. Boyd and Lelean: Enquiry into the Incidence of Pellagra among Turkish Prisoners of War in Egypt, R.A.M.C. Journal, December, 1919, to March, 1920. 4. K. Thomas: Archives Physiol. (du Bois Reymond), 1909. 5. Sherman: Jour. Biol. Chem., vol. xli., 1920. 6. W. H. Wilson: Appendix I., Annual Report of the Director, Lunacy Division, Egypt, 1919. 7. W. H. Wilson: See Report of Commission on the Prevalence of Pellagra among Turkish Prisoners of War in Egypt; Boyd and Lelean, 1919. 8. Goldberger and Wheeler: U.S.A. P.H. Service, Hyg. Lab. Bull., No. 120, 1920.

I am, Sir, yours faithfully,
W. H. WILSON,
Sept. 24th, 1920. School of Medicine, Cairo.

"SNAPPING OF THE BRAIN."

To the Editor of THE LANCET.

SIR,—I have been struck with the frequent complaints made of a sudden crash or noise, "as if something had snapped or given way in my brain," by persons suffering from early melancholia, neurasthenia, and psychasthenia, and I venture to ask your readers for a comparison of their experience and for an explanation of a symptom which occurs so often and gives rise to so much alarm. A number of patients date the commencement of their illness from this occurrence; they describe it vividly and clearly as a reality, and they urgently beg for relief in regard to it. One realises that the neurasthenic is in a state of generally exaggerated excitability, and that any stimulation of the peripheral auditory apparatus may be wrongly interpreted; but, in these cases there is no record of such a stimulation, yet the subjective acoustic sensation is a definitely felt occurrence.

We know how labyrinthine acuphenes—the sensation of rushing, ringing, or rustling—may occur in healthy persons, and that normally we can hear the opening of the Eustachian tube, the contraction of the muscles making tense the tympanum and moving the ossicles, as well as the beating of the arteries and the circulation of the blood. We also know that the ear is hypersensitive to bony conduction when aerial transmission is prevented by obstruction, but I know no explanation for these "snaps and crashes in the brain." Is this neurasthenic symptom a spontaneous revival of cerebral auditory images appearing automatically? Or may it be due to a local hyperæsthesia of the auditory cells in some special segment of the organ of Corti and the consequent sensation interpreted as reality?

Entotic sensations are so common in incipient mental diseases that a physiological explanation of this frightening symptom would be most helpful, and the ear specialist or the physiologist may be able to throw light upon it. That this symptom is remediable is acknowledged.—I am, Sir, yours faithfully,

ROBERT ARMSTRONG-JONES, M.D., F.R.C.P.
Harley-street, W., Sept. 22nd, 1920.

THE TUBERCULOUS EX-SERVICE MAN: HOW HE IS MISUNDERSTOOD.

To the Editor of THE LANCET.

SIR,—The magnitude and urgency of the problem of the tuberculous ex-Service man will be admitted by all whose lot it is to deal with this class of case. Time has already proved the failure of sanatorium benefit to fulfil all that it originally promised. We begin to see how futile is a three months' stay in a sanatorium followed by perfunctory after-care, or oftener by no after-care at all. There are now signs of the extension of the colony system, either as an adjunct to the sanatorium or in the form of separate training centres, which, when conducted upon right principles, would seem to have unlimited power for good. In order to achieve success in this direction, however, it is first necessary to have complete understanding of, and sympathy with, the tuberculous man, whose working capacity, temperament, and psychology are so utterly different from those of men who have been disabled from other causes that to apply to his case any cast-iron system is only courting disaster.

At certain training centres the cardinal mistake has been made of expecting tuberculous cases to do exactly the same work as other disabled men. It would be ludicrous, were it not tragic, to require an untrained tuberculous man to rise at 6 A.M. and, fortified by nothing but a cup of tea, to put in two hours of hard work before breakfast. It was not surprising that patient after patient broke down and had to re-enter a sanatorium. At the centre in question, which I will call X, a timely medical inquiry and inspection improved the situation of the unfortunate patient, who, if he happened to complain of feeling tired or did not feel up to performing his task, had been set down as a shirker. The obvious alternative plan to relaxing the cast-iron rule of an unsympathetic lay inspector was to remove all tuberculous men and place them in a training centre by themselves. At another centre, which I will call Y, a man suffering from neurasthenia was put on french-polishing, but he developed a cough and was then placed on poultry-farming. When home on leave a few weeks afterwards he saw his own medical man and was found to be in advanced consumption. Presumably there was medical supervision at this centre.

In any sanatorium a system, say of diet, which admits of no variation or modification is foredoomed to be a failure. At a training centre, where a man is beginning to feel his way by degrees towards a more active and useful existence, it is even more

necessary to enter into the individual case to understand the patient's mind. When the dead feeling of unfitness for the day's work overtakes a man it is a great boon to him to be allowed to spend a few extra hours in bed, for instance, or even to have his breakfast in bed. Perhaps the greatest tragedy of all is the "middle" or chronic case, who is not ill enough to go to a hospital for advanced disease, but who is incapable of performing a full day's work. His pension may only just keep the wolf from the door, and there is no margin; days of apparent fitness give the impression that he is loafing. The average employer of labour cannot yet realise the position of the tuberculous man. In certain trades the mere mention of a "weak chest" is enough at once to procure the sufferer's final discharge. Until it is recognised that the "careful consumptive," who has been educated in a sanatorium, is not dangerous to his fellows, he will be unfairly excluded from work which he could undertake quite well. Another tragedy is that of the disappointed man who, having kept well for some time, has been actively engaged in hard and productive work. A sudden acute hæmoptysis or pleurisy throws him back. His friends and his old employer fail to understand that such an accident is only an episode, and that he may yet again become capable of useful work.

The causes of our failures in treating the tuberculous man may be grouped as follows:—

1. *On the part of the profession.*—(*a*) Failure to recognise the disease early enough. (*b*) Want of supervision over so-called training centres. (*c*) The giving of unsuitable work to tuberculous patients. (*d*) The almost superstitious clinging to the view that the tuberculous man has only to "find a light job in the open air" to get well, and that no other treatment is necessary. (*e*) Lack of outside interest and profitable amusements and recreations in many sanatoriums.

2. *On the part of the public.*—(*a*) An unreasonable fear of the infectivity of tuberculosis. (*b*) Want of sympathy among employers of labour with the tuberculous man, and a refusal to see his limitations of working capacity. (*c*) Employment of instructors at training centres who do not understand sick men, much less the peculiar temperament of the consumptive. (*d*) Insufficient numbers of sanatoriums, and association with many of those already existing of the idea of permanent invalidism. (*e*) The attitude of the friendly societies, who are unwilling to allow their members to receive any remuneration whilst they are in receipt of sick benefit. It is gratifying to learn, however, that this legal difficulty has, in the case of the Cambridgeshire After-Care Association, been satisfactorily overcome.

To avoid a repetition of these tragedies we all need to realise, profession and public alike, that the tuberculous man is able to do a considerable amount of work, provided that (1) it is suitable in character, and (2) that he does it in his own time—i.e., that he is not obliged to keep up with others who are not so handicapped. His limited working capacity must be realised, or our training centres are doomed to failure from his standpoint. If he can only do two or four hours' work a day he feels he is making tangible progress towards recovery. Let employers admit the tuberculous ex-Service man to a part-time job, wherever possible. No training centre should exist without medical control, and every member of the staff, from the principal downwards, must be in fullest sympathy with the physical disabilities of the consumptive. Extra milk should be provided at all such institutions, and provision must be made for the nursing of patients who have temporary breakdowns. The patient must be disabused of the idea that he will never be any good for work, and closer study is needed of occupation-therapy.

I am, Sir, yours faithfully,
G. NORMAN MEACHEN, M.D., B.S. Lond.,
Tuberculosis Officer, County Borough of Southend-on-Sea.
Sept. 23rd, 1920.

NOVARSENOBENZOL IN MALARIA.

To the Editor of THE LANCET.

SIR,—The experience of Dr. J. N. D'Esterre in the treatment of recurrent malaria by novarsenobenzol (THE LANCET, Sept. 11th, p. 552) is more encouraging than mine. In 1918, when I was M.O. i/c Malaria Section of the 4th London General Hospital, I made a series of trials with novarsenobenzol on 8 cases of *P. vivax* infection and 3 cases of *P. falciparum* infection, working under the supervision of Sir R. Ross. The method of administration was in all cases intravenous and the dose 4 g. This was given weekly for three weeks, with quinine on the intervening days. Six of the *P. vivax* cases relapsed within 50 days and 2 of the *P. falciparum* cases. In addition to these 11 cases, 2 cases of *P. vivax* infection were treated with a course of kharsivan given intravenously in seven weekly increasing doses, without any quinine. Both these cases relapsed. The conclusion we arrived at was that neither of these arsenical preparations had anything to recommend them as a substitute for quinine in the routine treatment of malaria.

I know that in one hospital in Egypt good results were reported from the use of kharsivan, but I have not seen the exact figures nor do I know how they have stood the test of time as regards relapses. Arsenic preparations are of great value as an adjuvant to quinine, and the most generally useful is sodium cacodylate, which can be given as easily as a morphine injection.

I am, Sir, yours faithfully,
W. A. MURRAY, O.B.E., M.B., D.T.M. & H.,
D.C.M.S. for Tropical Diseases, Ministry of Pensions, Yorkshire Region.
Sept. 24th, 1920.

ROGER BACON'S WORKS.

To the Editor of THE LANCET.

SIR,—In a review of my pamphlet, "Greek Science and Modern Science," in your issue of Sept. 18th you write:—

> "Dr. Singer makes a statement which we do not consider altogether fair. He recalls how scholars ransack Eastern monasteries or the dustheaps of Egypt for any fragment of Greek literature, but 'the works of our first scientific thinker, Roger Bacon, lie here at hand, unedited, forgotten, neglected.' Surely the works of Roger Bacon are now in process of editing?"

It is indeed true that the works of Bacon are being edited, though with extreme slowness. That they are being edited at all is due primarily to the generosity of the Clarendon Press. That body, acting in the interests of learning and with great public spirit, has undertaken to print the *Opera hactenus inedita* of Roger Bacon as the text becomes available, well knowing that this venture cannot in the nature of the case ever make any financial return.

There is, however, also a secondary factor in the matter. The work of editing the Bacon text is extensive and laborious, and needs the attention of specialists. Such men must live and must be paid. For some time I had myself the privilege of paying for this work, but we have now established a small fund for the purpose, of which I am treasurer. Subscriptions have come in from the British Academy, Merton College, Oxford, and Corpus Christi College, Oxford, amounting in all to £135 a year, which I am, for the present, making up to £200 a year. Any assistance from readers of THE LANCET will, I need hardly say, be welcomed most heartily.

With such inadequate funds the progress of publication has been perforce exceedingly slow, but the Clarendon Press would, I know, welcome a more rapid rate of production. Some time ago, in conjunction with Dean Rashdall, Professor Little, the late Sir William Osler, and Professor Goodrich, I drew up, for private circulation, an exact statement of the state of publication of Bacon's works. I have still a few copies left, and would be glad to forward one to any interested in the subject.

You add that "it is surely not the case that Bacon's works are either neglected or forgotten." Yet I would venture to doubt if any appreciable percentage of educated Englishmen could give an intelligible account of the scientific work and philosophical standpoint of the first Englishman to whom the term "man of science" can be justly applied. It is surely not without significance that not only is much of Bacon's text still unedited but that no important work by him has ever been translated into English. With adequate funds such a task might be undertaken.

I am, Sir, yours faithfully,
CHARLES SINGER.
Westbury Lodge, Norham-road, Oxford, Sept. 18th, 1920.

THE NATIONAL HOSPITAL, QUEEN-SQUARE.

To the Editor of THE LANCET.

SIR,—Will you allow me to approach the medical profession through the medium of your columns, as there appears to be some misunderstanding in respect of the present functions of the National Hospital for the Paralysed and Epileptic? A short time ago, for financial reasons, it was found necessary to close wards, but, with the exception of a comparatively small number of beds, this step was averted by help from King Edward's Hospital Fund. The out-patient department has never been affected, and is fully open as before. As a large number of our patients are sent to us by medical practitioners it is important for these to know that the hospital is open for the reception of patients, both in the wards and the out-patient department.—I am, Sir, yours faithfully,

GODFREY H. HAMILTON,
Secretary.

Sept. 28th, 1920.

Medical News.

UNIVERSITY OF LIVERPOOL: FACULTY OF MEDICINE.—The results of the September examinations qualifying for the degree of Bachelor of Dental Surgery and for the Licentiateship in Dental Surgery respectively are as follows:—

Degree of Bachelor of Dental Surgery with Honours.—Second Class: E. H. Williams, with distinction in medicine.

Licentiateship in Dental Surgery.—F. H. Birch, E. O. Bray, R. E. Cook, O. R. Ellis, F. J. Kydd, W. M. Middleton, A. S. Newton, S. Pearson, H. O. Silcock, J. I. Smith, N. Williams.

POST-GRADUATE COURSES.—The following announcements of post-graduate lectures have reached us:—

Hospital for Sick Children, Great Ormond-street.—It has been decided to resume the weekly lectures (open to medical practitioners) on Thursdays at 4 P.M. The first lecture will be given on Oct. 7th by Mr. L. E. Barrington-Ward, on Glands of Neck, and subsequent lectures will be announced in our Medical Diary.

National Hospital for Diseases of the Heart.—It is proposed to resume the usual weekly lectures for post-graduates, to whom admission is free on presentation of cards. The lecturers will include Dr. S. Russell Wells, Dr. P. Hamill, Dr. F. W. Price, Dr. R. O. Moon, Dr. Strickland Goodall, and Dr. B. T. Parsons-Smith. The lectures will take place at the National Hospital, Westmoreland-street, London, W., on Mondays at 5.30 P.M., the first lecture being given on Oct. 11th by Dr. Russell Wells on Aortic Regurgitation. The following lectures will be announced in our Medical Diary.

Manchester Royal Infirmary.—A post-graduate lecture on Diagnosis of Acute Abdominal Crises will be given on Tuesday, Oct. 5th, at 4.30 P.M., by Mr. A. H. Burgess.

Salford Royal Hospital and Ancoats Hospital, Manchester.—A series of post-graduate lectures and demonstrations will be held through the winter. The course is free and commences on Thursday, Oct. 7th, when the first lecture will be delivered at Ancoats Hospital by Dr. Langley on Prognosis in Aortic Disease. Lectures will be given every Thursday and will be announced in our Medical Diary. The F.R.C.S. class for the Final Examinations of the Royal Colleges of Surgeons of England and Edinburgh is now proceeding.

St. Marylebone General Dispensary.—A post-graduate course of 12 practical demonstrations on the Management and Feeding of Infants and Young Children will be given by Dr. Eric Pritchard, on Tuesdays at 3 P.M. and Thursdays at 10.30 A.M., commencing Tuesday, Oct. 5th. The demonstration will be given at the St. Marylebone General Dispensary, 77, Welbeck-street, London, W. Opportunities will be afforded to students attending this course of visiting the Nursery Training School, 1, Wellgarth-road, Golders Green, on Saturday afternoons. A ticket for the course, at 2 guineas, and further information can be obtained from the secretary at the St. Marylebone Dispensary.

Maudsley Hospital.—The following lectures and practical courses of instruction, forming Part II. of the course for a diploma of Psychological Medicine, will be given at Maudsley Hospital, Denmark Hill, London, S.E. Sir Frederick Mott will deliver six lectures with demonstrations on the Pathology of Mental Diseases, including Brain Syphilis, its Symptomatology and Treatment, on Mondays at 2.30 P.M. and Fridays at 4 P.M., starting on Oct. 4th. Dr. C. Hubert Bond will give 12 lectures on the Diagnosis, Prognosis, and Treatment of Mental Diseases on Fridays at 2.30 P.M., starting on Oct. 8th. Dr. Bernard Hart will give lectures on the Psychoneuroses on Mondays at 5 P.M., starting on Oct. 4th. Sir Bryan Donkin will lecture on Mental Defect and Crime on Oct. 25th and Nov. 1st at 2.30 P.M. Dr. F. C. Shrubsall will deliver six lectures with demonstrations of cases on the Practical Aspect of Mental Deficiency on Wednesdays, starting on Oct. 6th.

West London Post-Graduate College.—The autumn session opens on Monday, Oct. 11th, when Sir William Bull will give the inaugural address at 5 P.M. Medical practitioners are invited to attend.

CHARING CROSS HOSPITAL MEDICAL SCHOOL.—The session will be opened on Monday, Oct. 4th, at 3.30 P.M., when the prizes will be distributed by Lady Dunboyne.

ROYAL SOCIETY OF MEDICINE.—A full programme is announced for the autumn session. The Section of Surgery (Subsection of Orthopædics) will hold its first meeting on Tuesday next, Oct. 5th, at 5 P.M., when the presidential address will be delivered by Mr. E. Laming Evans on Functional Results of Successfully Reduced Congenital Dislocation of the Hip. Cases will be demonstrated by Mr. R. C. Elmslie, Mr. P. B. Roth, Mr. H. A. T. Fairbank, and others. On Thursday, Oct. 7th, at 8 P.M., the Section of Obstetrics and Gynæcology will be addressed by the President, Dr. Henry Briggs, on the Female Pelvic Floor. A specimen will be shown by Mr. Douglas Drew and short communications made by the President, Dr. Munro Kerr, and Dr. A. J. McNair. At 8.45 P.M. on the same day the Hughlings Jackson lecture on a New Conception of Aphasia will be delivered by Dr. Henry Head at the Section of Neurology. On Friday, Oct. 8th, at 5.30 P.M., there will be an exhibition of cases at the Clinical Section, when Mr. V. Zachary Cope will read a short paper on the Clinical Significance of Shoulder Pain in Upper Abdominal Lesions. On Monday, Oct. 11th, at 5.30 P.M., Wing Commander Martin Flack, R.A.F., will speak on Medical Requirements for Air Navigation in the War Section. The presidential address to the Section of Neurology will be delivered at 8.30 P.M. on Thursday, Oct. 14th, by Dr. Ernest S. Reynolds on the Causes of Nervous Disease. On Friday, Oct. 15th, at 8.30 P.M., an exhibition of skiagrams illustrating renal and hepatic calculus will be held by the Section of Electrotherapeutics, and Mr. S. Gilbert Scott will deliver the presidential address.

MEDICAL SOCIETY OF LONDON.—The syllabus of the first half of the session 1920–1921 has just been issued. The annual general meeting on Oct. 11th, at 8 P.M., will be followed at 8.30 P.M. by an ordinary meeting, when the presidential address will be delivered by Sir William Hale White on "Then and Now." The next meeting will be held on Oct. 25th, when a discussion on "The Determination of Degree of Renal Function" will be introduced by Professor J. B. Leathes, F.R.S., followed by Dr. Langdon Brown, Mr. Thomson Walker, Mr. Frank Kidd, Dr. H. Maclean, and Dr. W. H. Willcox. Further meetings will take place in November and December. The Lettsomian lectures will be delivered in February and March, 1921, by Mr. George E. Gask, and the annual oration in May, 1921, by Lord Dawson of Penn. The President for this session is Sir William Hale White, and the honorary secretaries are Dr. William H. Willcox and Mr. Herbert W. Carson.

HUNTERIAN SOCIETY.—The society will commence its new session on Wednesday, Oct. 13th, at 9 P.M., when Sir George Newman will deliver the first Hunterian lecture on the Ministry of Health as an Instrument in Preventive Medicine. The address will be given at Sion College, Embankment (close to Blackfriars Bridge). A programme of meetings has been arranged for the session, and these will be held at Sion College on the second and fourth Wednesdays of the month. All members of the profession are invited to attend the meetings. The honorary secretaries are Dr. R. L. Mackenzie Wallis, 24, Upper Berkeley-street, London, W.1, and Mr. M. W. B. Oliver, 128, Harley-street, London, W.1, from whom further particulars may be obtained.

CHADWICK LECTURES.—Three public lectures on Health, the Red Cross, and the League of Nations, will be delivered by Professor F. F. Roget, of the University of Geneva, in the Lecture Hall of the Surveyors' Institution, 12, Great George-street, Westminster, on Mondays, Oct. 18th and 25th, and Friday, Oct. 29th, at 5 P.M., and will be illustrated by lantern slides. The first lecture will be on the League of Nations and the League of Red Cross Societies, and the chairman will be Sir William Collins. In the second lecture the Declaration of the five national delegations sitting in conference at Cannes will be analysed and considered, and the third, at which the Hon. Sir Arthur Stanley will preside, will deal with the programme laid down for the work of the medical department of the League of Red Cross Societies. All information about Chadwick Public Lectures can be obtained from Mrs. Aubrey Richardson, at the offices of the Trust, 13, Great George-street, Westminster.

THE general council of King George's Fund for Sailors has allocated an interim grant of £2500 towards the capital expenditure for the current year of the King George V. Merchant Seamen's Hospital at Malta.

A JOINT meeting of the Tuberculosis Society of Great Britain and Ireland and the Tuberculosis Group of the Society of Medical Officers of Health will be held during the forthcoming annual conference at Liverpool, Oct. 7th–9th, of the National Association for the Prevention of Tuberculosis.

LONDON SCHOOL OF TROPICAL MEDICINE.—A dinner will be held at the Royal Automobile Club, Pall Mall, London, S.W., on Tuesday, Oct. 12th, under the presidency of Captain A. W. Clarke, the deputy chairman of the Seamen's Hospital Society. The secretary of the school will be glad to hear from past students who may desire to be present.

LONDON DERMATOLOGICAL SOCIETY.—The inaugural meeting will be held at St. John's Hospital, 49, Leicester-square, at 5 o'clock on Tuesday, Oct. 19th. Dr. Prosser White, physician to the Royal Albert Edward Infirmary, Wigan, will preside and the address will be given by Sir William Collins. Members of the profession are invited to attend.

SOCIETY FOR THE STUDY OF INEBRIETY.—A meeting will be held in the Rooms of the Medical Society of London, 11, Chandos Street, London, W., on Tuesday, Oct. 12th, at 4 P.M., when Dr. James A. Davidson will open a discussion on "Special Clinics for Inebriates." Subscriptions and donations should be forwarded to the honorary treasurer, Mr. Arthur Evans, M.S., F.R.C.S., 28, Devonshire-place, W., and other communications to the honorary secretary, T. N. Kelynack, at 19, Park-crescent, Portland-place, London, W.

CHILD STUDY SOCIETY.—This society for the scientific study of the mental and physical condition of children and of educational methods, announces a programme of five lectures and discussions to be held on Thursdays, at 6 P.M., during the autumn. The first lecture will be given on Oct. 7th by Mr. C. W. Kimmins, D.Sc., the subject being the Handwriting of the Future. Other lecturers will include Dr. A. R. Abelson, Dr. F. C. Crookshank, and Dr. William Brown, while a discussion on Vocational Tests will be held on Nov. 4th. Forms of application for membership (10s.) and associate membership (5s.), and full particulars of the society, can be obtained from the secretary, 90, Buckingham Palace-road, London, S.W.

SOCIETY OF TROPICAL MEDICINE AND HYGIENE.—The opening meeting of the session will be held on Friday, Oct. 15th, at 8.30 P.M. The President for the session is Professor W. J. R. Simpson and the Vice-President is Sir James Cantlie. Notices of the dates of meetings and of the agenda to be transacted are sent to all Fellows resident in the United Kingdom. Those who desire to receive a copy in advance of any paper to be read before the society, in which they may be specially interested, can receive it on application to the secretaries, Dr. Arthur G. Bagshawe and Dr. C. Morley Wenyon, 11, Chandos-street, Cavendish-square, London, W. 1.

THE PHYSICS AND CHEMISTRY OF COLLOIDS.—As announced in our issue of July 24th, the Faraday Society and the Physical Society of London have arranged to hold a joint meeting of their members to discuss in its many aspects the question of colloids and their significance. The meeting is to take place on Oct. 25th at the Institution of Mechanical Engineers, Storey's Gate, London, S.W. The chair will be taken by Professor Sir W. H. Bragg, F.R.S., and the discussion will be opened by Professor Th. Svedberg, of the University of Upsala, a well-known authority on the subject, who will give a general survey of the many questions opened up by this comparatively fresh field of study. Non-members of the societies are invited to attend the meeting, and can obtain tickets of admission on application to Mr. F. S. Spiers, 10, Essex-street, London, W.C.

THE LATE DR. ROBERT JAMES COLLIER.—Dr. Collier died at Bangor, county Down, on Sept. 22nd, at the age of 60. He was educated at Queen's College, Belfast, and qualified L.R.C.P. & S. Edin. and L.R.F.P.S. Glasg. in 1891. He joined the late Dr. J. P. Topping, of Forest Gate, and shortly afterwards succeeded him in practice, remaining at Manor Park for more than 25 years. Dr. Collier was a popular practitioner in the East Ham district, and took great interest in the St. John Ambulance Brigade, of which he was honorary surgeon. He had retired during the past year, finding the strain of practice too great for him. His brother, Dr. S. R. Collier, practises in Wimbledon, and his sister, Dr. Georgina Collier, married Dr. Joseph Harvey, of Merton Park.

MEMORIAL TO A MEDICAL MAN.—The Committee of the Berkeley (Gloucestershire) Cottage Hospital has decided to place a brass memorial tablet in the institution in memory of the late Dr. W. R. Awdry, who was honorary medical officer to the hospital for 35 years.

ROYAL VICTORIA INFIRMARY, NEWCASTLE-ON-TYNE.—The orthopædic extension, to the opening of which we recently referred, is at present under the Ministry of Pensions, and the beds are occupied by disabled Service men. Civilians are, however, being treated in the massage and electrical departments. When freed from the Ministry of Pensions the department will, it is understood, be used permanently for civilian work.

BERI-BERI IN MANCHESTER.—It was reported on Sept. 27th at a meeting of the port sanitary authorities that five Mohammedan seamen are inmates of Hope Hospital, Pendleton, suffering from beri-beri. They are part of a crew of a steamship from Australian ports via Capetown to Manchester. After leaving Capetown 13 cases were discovered, and one man died. In all 17 cases were treated at Hope Hospital, and 13 were discharged as cured last Friday.

MANCHESTER HOSPITALS' DEBTS.—It appears that there is a deficiency in the income of all the hospitals of Manchester and Salford amounting to nearly £27,000, so that it is essential for something to be done quickly to help to relieve them. The officials of the Hospital Saturday Fund find the greatest difficulty in getting at the working men and women for whose benefit the hospitals chiefly exist. The response of employers of labour to appeals for permission to permit the collection of funds in warehouses and workshops has not in many cases been satisfactory. It has been arranged to make a special appeal to the public this week. It is understood that in Leeds and Birmingham there is no difficulty in taking workshop collections, and the employers there render every assistance.

MEDICAL DEMOBILISATION IN MANCHESTER.—The final report, just issued, of the Manchester War Committee contains an interesting account of the Financial Assistance Guarantee Fund, established for the purpose of assisting any Service or ex-Service practitioner subjected to financial loss as a direct result of electing to serve his country. It was decided not to ask for subscriptions, but to invite medical men at home to guarantee a fixed sum, to be called up in such instalments as might be required. An appeal to the whole of the profession resulted in guarantees to the amount of £1246. The Committee had also a sum of £300 which had been presented by two medical men of the neighbourhood to be utilised for providing assistance in any case regarded as necessitous. One call has been made on the Guarantee Fund to the extent of 20 per cent., and financial assistance has been rendered in one case. As it is not considered advisable to dissolve the Fund at the moment, the money actually in hand has been placed in the hands of trustees. The report remarks that it is a matter for sincere congratulation that up to the present so little distress has been brought to light among those who have returned from service.

PRESTWICH ASYLUM AND SERVICE PATIENTS.—Allegations by the National Federation of Discharged and Demobilised Sailors and Soldiers against the treatment of Service patients at the County Asylum, Prestwich, Lancs., are now being investigated jointly by the Ministry of Pensions and the Commissioners of the Board of Control. The investigation began on Sept. 27th, and each one of the 260 Service patients now at Prestwich will be personally interviewed. The evidence of those who have made the charges—charges, amongst others, of poor food and insufficient attention—will then be taken. The report of the inquiry will be published in due course.

HUDDERSFIELD AND INFANTILE MORTALITY.—A new experiment for the further reduction of infantile mortality is being made at Huddersfield, where the good work initiated by Mr. Benjamin Broadbent, brother of the late Sir William Broadbent, was so successful as to reduce infantile mortality in the town by about 30 per cent. The new scheme adopts the old principle of keeping infants and mothers at home and providing help there. At first the scheme will be applied over one-third of the borough. The plan provides for one visit per week per child during the first month, two visits per month during the next two months, and one visit thereafter, supplemented by the work of the Public Health Union. The medical officer, Dr. S. G. Moore, emphatically urges that none but duly qualified medical women should be employed, with help from properly trained nurses. The estimated cost for the whole of the borough is £3700, and includes three women doctors at £500 per annum, six nurses at £180, and nursing material and other forms of help £1000.

MEDICAL OFFICERS OF MATERNITY AND CHILD WELFARE CENTRES.—A meeting will be held on Friday, Oct. 15th, at 5.30 P.M., at the House of the Royal Society of Medicine, 1, Wimpole-street, London, when Dr. Harold Waller will open a discussion upon Dental Disease in the Mother as an Adverse Factor in Infant Welfare.

CONFERENCE ON CRIPPLES.—A joint conference on Work for Invalid and Crippled Children is to be held by the Invalid Children's Aid Association and the Central Committee for Care of Cripples on Nov. 16th and 17th in the Council Chamber of the Guildhall, London. The subjects for discussion include the bearing of recent legislation on work for physically defective children, coöperation between the State and voluntary bodies, accounts of existing institutions in America, on the continent, and in the United Kingdom for the treatment and education of these children, and the scheme for future development of work suggested by the Central Committee for the Care of Cripples. Further particulars may be obtained from the Conference Secretary, Central Committee for Care of Cripples, 20, Berkeley-street, London, W.

LITERARY INTELLIGENCE.—The University of London Press, Ltd., announces the forthcoming publication of "Mind and Work: The Psychological Factors in Industry and Commerce," by Dr. Charles S. Myers, F.R.S., and "Intrinsic Cancer of the Larynx and the Operation of Laryngo Fissure," by Dr. Irwin Moore.—Messrs. Witherby, announce that they will shortly publish a book entitled "Initiative in Evolution," by Dr. Walter Kidd.

THE National Baby Week Council has removed to 5, Tavistock-square, London, W.C. 1. (Telephone: Museum 6353.)

AT the last meeting of the Yeovil board of guardians Dr. C. J. Marsh, who has been medical officer for the first district and workhouse, resigned his appointment after 40 years' service. The resignation was accepted with keen regret, and it was decided to place on record the high appreciation of Dr. Marsh's services.

SOUTHMEAD HOSPITAL, BRISTOL.—The Bristol guardians have transferred a number of inmates from their other institutions to the Southmead Hospital. This hospital has not hitherto been available for the Poor-law authorities, who built it, as it was used during the war as a military hospital. During that period of its existence no less than 37,397 patients (2315 officers and 35,082 N.C.O.'s and men) were admitted to the wards.

BRISTOL GENERAL HOSPITAL.—At the half-yearly meeting of the governors of this institution Mr. H. M. Baker, the chairman, alluded to the resignation, under the age limit, of Dr. George Parker, honorary physician to the hospital. He stated that everybody connected with the charity regretted this resignation, but rejoiced that Dr. Parker had promised to look after the electrical and massage department for the next 12 months. Mr. Baker added that Dr. Carey Coombs had been elected a full honorary physician, and expressed the satisfaction of the committee that his great services to the hospital had been thus recognised.

THE LATE DR. W. S. CAMPBELL.—Walter Scott Campbell, M.B., C.M. Glasg., died at a nursing home in Exeter on Sept. 14th, after a short illness, in his sixty-third year. He graduated M.B. and C.M. of Glasgow University in 1880, and had been in practice for more than 30 years at Crediton, Devon. At the time of his death he was medical officer to the Crediton district and workhouse. Dr. Campbell was very popular in Crediton, where he will be much missed.

A DENTAL HOSPITAL IN JOHANNESBURG.—At a meeting of the Witwatersrand University Committee held at Johannesburg on August 27th the need for a dental hospital for Johannesburg and the Rand was discussed. In the absence of the Mayor of Johannesburg Professor Jan H. Hofmeyr presided, and reported on the steps taken to secure training in dental surgery in connexion with the medical school. The Administrator of the Transvaal had been approached with reference to the establishment of a dental hospital at Johannesburg, but had pleaded that no funds were available for the purpose. A deputation from the University Committee interviewed the Administrator and pointed out to him that the capital cost of such a hospital would not be very material, and, as the coöperation of local dentists had been assured, running expenses would be small. The general health of the people, now recognised to depend so much on its dental health, was an even more important argument in favour of such a claim than the facilities it would afford for dental training. Mr. Colin Wade estimated that 70 per cent. of the children in schools needed dental attention. The Transvaal children seemed to be worse off than those in many other places. It was resolved to send a deputation to the Administrator.

Medical Diary.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

MEETINGS OF SECTIONS.

Tuesday, Oct. 5th.

SECTION OF SURGERY: SUBSECTION OF ORTHOPÆDICS: at 5 P.M.

Presidential Address:

Mr. E. Laming Evans: Functional Results of Successfully Reduced Congenital Dislocation of the Hip.

Members are invited to show cases and skiagrams of the above class.

Cases:

Mr. R. C. Elmslie: Further Report on a Case of Cyst of Tibia.

Mr. P. B. Roth: (1) Pseudo-hypertrophic Muscular Paralysis in a Boy 7½; (2) Osteogenesis Imperfecta in a Man 22.

Mr. H. A. T. Fairbank: (1) Further Report on a Case of Bilateral Congenital Elevation of Scapula with Subluxation of Shoulder-Joint; (2) Case of Osteitis Deformans.

And others.

Thursday, Oct. 7th.

SECTION OF OBSTETRICS AND GYNÆCOLOGY: at 8 P.M.

Specimen:

Mr. Douglas Drew: Fibrosarcoma from Hollow of Sacrum.

Short Communications:

The President: Spoon-shaped Depressed Birth Fracture of the Frontal Bone treated by Elevation.

Dr. Munro Kerr: (1) The Surgery of the Uterus Bicornis Unicollis with a Case of Resection of the Uterus followed by Two Normal Pregnancies; (2) The Intra-vesical Repair of Inaccessible Vesico-vaginal Fistulæ.

Dr. A. J. McNair: A Case of Placenta Prævia with Basa Prævia. Cæsarean Section.

Presidential Address:—Dr. Briggs: The Female Pelvic Floor.

SECTION OF NEUROLOGY: at 8.45 P.M.

Hughlings Jackson Lecture:

Dr. Henry Head: A New Conception of Aphasia.

Friday, Oct. 8th.

CLINICAL SECTION: at 5.30 P.M.

Exhibition of Cases (Cases at 5 P.M.)

Short Paper:—Mr. Zachary Cope: The Clinical Significance of Shoulder-pain in Upper Abdominal Lesions.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

WEST LONDON POST-GRADUATE COLLEGE, West London Hospital, Hammersmith, W.

MONDAY, Oct. 4th.—2 P.M., Dr. Simson: Diseases of Women. 2 P.M., Mr. B. Harman: Eye Department.

TUESDAY.—2 P.M., Dr. Burnford: Medical Out-patients. 2.30 P.M., Mr. Addison: Visit to Surgical Wards.

WEDNESDAY.—10 A.M., Mr. MacDonald: Genito-urinary Department. 2 P.M., Dr. Morton: X Ray Department.

THURSDAY.—2 P.M., Mr. Baldwin: Orthopædic Department. 2.30 P.M., Dr. A. Saunders: Visit to Medical Wards.

FRIDAY.—2 P.M., Mr. T. Gray: Surgical Out-patients. 2 P.M., Dr. Pernet: Skin Department.

SATURDAY.—10 A.M., Dr. A. Saunders: Medical Diseases of Children.

Daily:—10 A.M., Ward Visits. 2 P.M., In-patient, Out-patient Clinics and Operations.

NATIONAL HOSPITAL FOR THE PARALYSED AND EPILEPTIC, Queen-square, W.C. 1.

MEDICAL SCHOOL.

MONDAY, Oct. 4th.—2–3.30 P.M., Out-patient Clinic: Dr. Collier. 3.30 P.M., Lecture: Dr. Kinnier Wilson: Symptomatology of Focal Lesions of the Cerebrum.

TUESDAY, Oct. 5th.—2–3.30 P.M., Out-patient Clinic: Dr. Grainger Stewart. 3.30 P.M., Dr. Risien Russell: Ward Cases.

WEDNESDAY, Oct. 6th.—2 P.M., Lecture: Dr. Hinds Howell: The Afferent Path (Anatomy). 3.15 P.M., Lecture: Mr. Scott: Examples of Diseases of the Nose and Nasal Accessory Sinuses associated with Disturbances of the Nervous System.

THURSDAY, Oct. 7th.—2–3.30 P.M., Out-patient Clinic: Dr. Farquhar Buzzard. 3.30 P.M., Lecture: Dr. Kinnier Wilson: Symptomatology of Focal Lesions of the Cerebrum.

FRIDAY, Oct. 8th.—2–3.30 P.M., Out-patient Clinic: Dr. Gordon Holmes. 3.30 P.M., Lecture: Dr. Taylor: Epilepsy.

SATURDAY, Oct. 9th.—9 A.M., Surgical Operations.

Fee for Post-Graduate Course £7 7s. C. M. HINDS HOWELL, Dean.

HOSPITAL FOR SICK CHILDREN, Great Ormond-street, W.C.

THURSDAY, Oct. 7th.—4 P.M., Mr. Barrington-Ward: Glands of Neck.

ST. MARYLEBONE GENERAL DISPENSARY, 77, Welbeck-street, Cavendish-square, W.

Post-Graduate Course on Infant and Child Welfare.

TUESDAY, Oct. 5th.—10.30 A.M., Dr. E. Pritchard: Practical Demonstrations on the Management and Feeding of Infants and Young Children—Demonstration I., Causes of Infant Mortality.

THURSDAY.—3 P.M., Demonstration II., How to Establish an Infant Welfare Centre and Conduct an Infant Consultation.

MANCHESTER ROYAL INFIRMARY POST-GRADUATE CLINIC.

TUESDAY, Oct. 5th.—4.30 P.M., Lecture:—Mr. A. H. Burgess: Diagnosis of Acute Abdominal Crises.

SALFORD ROYAL HOSPITAL AND ANCOATS HOSPITAL POST-GRADUATE DEMONSTRATIONS, at the two Hospitals alternately.

THURSDAY, Oct. 7th.—Dr. Langley: Prognosis in Aortic Disease. (At Ancoats Hospital.)

Appointments.

Successful applicants for vacancies, Secretaries of Public Institutions, and others possessing information suitable for this column, are invited to forward to THE LANCET *Office, directed to the Sub-Editor, not later than 9 o'clock on the Thursday morning of each week, such information for gratuitous publication.*

LEVICK, G. M., M.R.C.S., L.R.C.P. Lond., has been appointed to the Charge of the Electrical Department at St. Thomas's Hospital.

WATSON, Sir C. GORDON, F.R.C.S. Eng., Surgeon to St. Bartholomew's Hospital.

Certifying Surgeons under the Factory and Workshop Acts: MACPHERSON, J. M., M.B., Ch.B. Glasg. (Loughor); PHILIP, C. C., M.B., Ch.B. Edin. (Gatehouse).

Vacancies.

For further information refer to the advertisement columns.

Aberdeen University.—Lectureship in Bacteriology. £600.
Ballinasloe District Asylum.—Second Asst. M.O. £300.
Barnsley, Beckett Hospital and Dispensary.—Sen. H.S. £250.
Barnstaple, North Devon Infirmary.—H.S. £200.
Battersea General Hospital (Incorporated), Battersea Park, S.W.—Third Res. M.O. £200.
Bedford County Hospital.—Asst. H.S. £150.
Bloemfontein Municipality (O.F.S.), South Africa.—M.O.H. £1000.
Bombay Municipal Hospitals.—Med. Supt. Rs. 1000 per month.
Bridge of Weir, Renfrewshire, Consumption Sanatoria of Scotland.—Asst. M.O. £200.
Brighton, Royal Sussex County Hospital.—Asst. H.S. £150.
Brompton Hospital Sanatorium, Frimley.—Asst. Res. M.O. £250.
Bury and District Joint Hospital Board.—Res. Asst. Med. Supt. £450.
Cancer Hospital (Free), Fulham-road, London, S.W.—H.S. £150.
Canning Town Women's Settlement Hospital, Balaam-street, Plaistow, E.—Female Hon. Asst. P.
Carnegie Dunfermline Trust.—Asst. M.O. £500.
Chelsea Infirmary, S.W.—First and Second Asst. M.O.'s, £400 and £325 respectively.
Colonial Service.—M.O.'s for West African Medical Staff, Government Service in Malaya, East African Protectorates, West Indies (including British Guiana), Fiji, and the Western Pacific, &c.
Countess of Dufferin's Fund, India, Women's Medical Service.—Three Medical Women. Rs. 350 per mensem.
Coventry and Warwickshire Hospital, Coventry.—Hon. P.
Dorset County Council.—Asst. County M.O. £500.
Dover Borough.—Asst. M.O.H. £750.
Hampstead General and North-West London Hospital, Haverstock Hill, N.W.—Radiologist. £50.
Hospital for Consumption and Diseases of the Chest, Brompton, S.W.—H.P. 30 guineas.
Hospital for Sick Children, Great Ormond-street, W.C.—Cas. M.O £200. Also Asst. Cas. M.O., H.S., and H.P. £50 each.
Huddersfield Royal Infirmary. Two Asst. H.S.'s. £150 each.
Ingham Infirmary and South Shields and Westoe Dispensary.—H.S. £175.
Johannesburg, South African School of Mines and Technology.—Professorship of Vet. Anat. £860.
Kensington Board of Guardians, Marloes-road.—Second and Fourth Asst. Res. M.O.'s. £325 and £250 respectively.
Lancaster County Asylum.—Asst. M.O. £300.
Leavesden Mental Hospital, King's Langley, Herts.—Jun. M.O. £515 6s.
Leeds Public Dispensary, North-street.—Hon. Dent. S.
Leicester Royal Infirmary.—Res. Anæsth. £250.
Liverpool. Mill-road Infirmary.—Asst. Res. M.O. £280.
London Homœopathic Hospital, Great Ormond-street and Queen-square, Bloomsbury, W.C.—Asst. S. Also Anæsth. £50.
Macclesfield General Infirmary.—Res. H.S. £200.
Maidstone, Kent County Mental Hospital.—Jun. Asst. M.O. £300.
Manchester, Ancoats Hospital.—Res. Surg. O. £250. Hon. Dent. S.
Manchester, Greengate Dispensary, Salford.—Hon. Visiting P.
Manchester, Hulme Dispensary, Dale-street, Stretford-road.—H.S. £400.
National Hospital for Diseases of the Heart, Westmoreland-street, W.—Res. M.O. £150.
Northampton, County Borough Education Committee.—Female Asst. Sch. M.O. £500.
Nottingham City.—Asst. M.O.H. £800.
Oxford, Radcliffe Infirmary and County Hospital.—Administrator. £600.
Paddington Green Children's Hospital, Paddington Green, W.—H.P. and H.S. £150 each.
Plymouth, South Devon and East Cornwall Hospital.—H.S. £200.
Queen's Hospital for Children, Hackney-road, Bethnal Green, E.—H.S. £100.
Reading, Royal Berkshire Hospital.—H.S. £200.
Royal National Orthopædic Hospital, 234, Great Portland-street, W.—Res. H.S. £200.
St. Bartholomew's Hospital.—Asst. S. Also P.
St. Mary's Hospital for Women and Children, Plaistow, E.—Hon. S.
St. Pancras Borough Council.—Infant Consultations M.O. 1½ guineas per consultation.
St. Pancras House and St. Pancras Hospital, King's-road and Pancras-road, N.W.—Asst. M.O. £300.
Salford Royal Hospital.—H.S. and Cas. H.S. £150 each.
Samaritan Free Hospital for Women, Marylebone-road, N.W.—H.S. £150.
Sheffield Royal Infirmary.—H.S. £150.
Shoreditch Metropolitan Borough.—Asst. M.O.H. £600.
Somerset, Wells Asylum.—Asst. M.O. £300.
Taunton and Somerset Hospital.—Jun. H.S. £150.
Ventnor, Royal National Hospital for Consumption and Diseases of the Chest.—Asst. Res. M.O. £300.
Warrington Infirmary and Dispensary.—Jun. H.S. £200.
Western Skin Hospital, 44-46, Hampstead-road, N.W.—Hon. Dermat. Also Hon. Path. and Hon. Bact.
Westmorland County Education Committee and Kendal Borough Education Committee.—Dent. Practitioner. £500.
Wigan Infirmary.—Hon. P. and Asst. Hon. P.
Winchester, Royal Hampshire County Hospital.—H.S. £250.
Wolverhampton and Staffordshire General Hospital.—H.S. £200.
Wolverhampton County Borough Education Committee.—Asst. Sch. M.O. £500.
Worcester County and City Mental Hospital, Powick.—Jun. Asst. M.O. £350.
Worcestershire County Council.—Sch. Oculist. £550.

Births, Marriages, and Deaths.

BIRTHS.

METCALFE.—On Sept. 22nd, at Dean House, Liskeard, Cornwall, the wife of Brian Metcalfe, M.R.C.S., L.R.C.P., of a daughter.

ROCHE.—On Sept. 23rd, at Vienna, Austria, the wife of Captain Laurence Roche, M.C., R.A.M.C., of a daughter.

MARRIAGES.

COOK YOUNG—LAWRENCE.—On Sept. 13th, at the Cathedral, Bombay, Lieutenant-Colonel A. W. Cook Young, I.M.S., to Mrs. P. L. Lawrence, late of Kintarbert, Tarbert, Loch Fyne.

DEATHS.

COLLIER.—On Sept. 22nd, at Bangor, co. Down, R. J. Collier, M.R.C.S., L.R.C.P. (late of Manor Park, Essex), aged 60.

DAVY.—On Sept. 25th, at Burstone Manor, Bow, Devon, Richard Davy, F.R.S.E., F.R.C.S., M.B.

LEWTAS.—On Sept. 23rd, at Cheyne-place, S.W., after a few days' illness, Lieutenant-Colonel John Lewtas, C.B.E., late I.M.S.

ROBERTS.—On Sept. 27th, at his residence, "Ravenswood," Broughton Park, Manchester, David Lloyd Roberts, M.D., F.R.C.P., F.R.S.E. Cortège will leave the residence on Friday next, Oct. 1st, at 11.30 for interment at St. Paul's Church, Kersal, at 12 noon. Will friends kindly accept this as the only intimation, and address inquiries to Messrs. John Bye and Co., King-street West, Manchester.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

BOOKS, ETC., RECEIVED.

BALE, JOHN, SONS, AND DANIELSSON, London.
Synoptic Chart of Cardiac Examination. Arranged by J. D. Comrie, M.D.

BELL, G., AND SONS, London.
In a Nutshell: Cons and Pros of the Meatless Diet. By E. Bell, M.A. Pp. 46. 1s.
The Year Book of the Universities of the Empire, 1918–1920. Edited by W. H. Dawson. Pp. 503. 15s.

FROWDE, HENRY, AND HODDER AND STOUGHTON, London.
Diseases of the Eye. By M. S. Mayou, F.R.C.S. 3rd ed. Pp. 326. 10s. 6d.

KEGAN PAUL, TRENCH, TRUBNER, AND CO., London.
The Psychology of Dreams. By W. S. Walsh, M.D. Pp. 361. 12s. 6d.

KIMPTON, HENRY, London.
The Newer Methods of Blood and Urine Chemistry. By R. B. H. Gradwohl, M.D., and A. J. Blaivas. 2nd ed. Pp. 418. 30s.
Symptoms in the Diagnosis of Disease. By H. A. Hare, M.D. 8th ed. Pp. 562. 36s.

LEWIS, H. K., AND CO., London.
Anæsthetics: Their Uses and Administration. By Dudley W. Buxton, M.D. 6th ed. Pp. 548. 21s.
Theory and Practice of Nursing. By M. A. Gullan, Sister Tutor of St. Thomas's Hospital. Pp. 214. 10s. 6d.
Theory and Practice of Massage. By Beatrice M. Goodall-Copestake. 3rd ed. Pp. 270. 20 plates. 12s. 6d.
Pharmacopœia Prepared by a Committee of the Medical Staff of the Queen's Hospital for Children. 6th ed. Pp. 76.

LIVERPOOL BOOKSELLERS CO. SIMPKIN MARSHALL, London.
Hypnotism and Treatment by Suggestion. By A. E. Davis, F.R.C.S. Edin. 3rd ed. Pp. 202. 5s.

LONGMANS, GREEN, AND CO., London.
Organic Chemistry for Medical, Intermediate Science, and Pharmaceutical Students. By A. K. Macbeth, D.Sc. Pp. 235. 6s. 6d.
Directions for a Practical Course in Chemical Physiology. By W. Cramer, D.Sc., M.R.C.S., L.R.C.P. 4th ed. Pp. 138. 4s. 6d.
The Manufacture of Sugar from the Cane and Beet. By T. H. P. Heriot, F.I.C. Pp. 426. 24s.
Margarine. By W. Clayton, M.Sc. Pp. 187. 14s.
Children's Dreams. By C. W. Kimmins, D.Sc. Pp. 126. 5s.

NEW ERA PRINTING COMPANY, Lancaster, Pa., U.S.A.
American Climatological Association Transactions, 1918. Vol. XXXIV. Pp. 294.

PUBLISHED BY THE AUTHOR, 3, York Gate, London.
Medicine in England During the Reign of George III. By Arnold Chaplin, M.D. Pp. 141. 6s.

PUTNAM'S (G. P.) SONS, London and New York.
The Control of Parenthood. By Professor J. Arthur Thomson, Professor Leonard Hill, The Very Rev. Dean Inge, Mr. Harold Cox, Dr. Mary Scharlieb, Sir Rider Haggard, Rev. Principal A. E. Garvie, Rev. F. B. Meyer, and Dr. Marie Stopes. Introduction by the Bishop of Birmingham. Edited by Rev. James Marchant. Pp. 203. 7s. 6d.

Notes, Short Comments, and Answers to Correspondents.

SOME COMMON INDUSTRIES AND INCIDENTAL DISEASES IN THEIR VICINITY.

BY JAMES GAIRDNER, M.D. EDIN., D.P.H. ST. AND.,
MEDICAL OFFICER OF HEALTH, CRIEFF BURGH.

THE industries I propose to inquire into are those of the blacksmith and the plumber. Roughly speaking, a blacksmith is one who works in iron, and a plumber is one who works in lead. It might be contended that there is little use in finding fault with the melting of some tons of iron and lead in any small burgh when millions of tons of iron and lead ores are smelted in the mining districts. But the iron ore smelter has an eye to economy. He finds that the gases escaping from his blast furnace are highly inflammable. He therefore prevents their escape into the air and utilises them to assist in keeping up the necessary heat. In the same way the lead ore smelter constructs flues of great length into which he conducts the lead fumes. These flues are subsequently swept to recover the lead.

The Blacksmith and Plumber.

But it is otherwise with the blacksmith and the plumber. They allow their fumes to go right out to the air, generally at a very low level, and their chimneys never require to be swept. The blacksmith is only exposed to fumes when withdrawing glowing metal from his fire. In this connexion I would note that blacksmiths are reputed to be especially subject to cancer.

The intercepted fumes from a lead-melting furnace in Crieff referred to were examined by the city of Dundee analyst and found to contain manganese. The business was officially declared injurious to health and closed.

On Sept. 28th, 1895, I issued the following report:—

"No one would contend that a lump of lead would be rapidly acted upon when exposed to the air, but if it be in a finely powdered state it rapidly ignites. In the method detailed in my report of March, 1894, there exist very favourable conditions for the fusion and volatilisation of the metal. The material is in the shape of flat sheets, or in tubes, and contains a quantity of tin in the form of solder, and carbon in the form of wood and dirt. It is well known that the fusibility of lead is greatly increased by adding tin, and its volatility by adding carbon. In estimating the nature of the fumes the impurities of commercial lead and tin have to be taken into account.

"The following is an analysis of such fumes made by the city of Glasgow analyst: lead, 0·08 per cent.; manganese, 0·05 per cent.; iron, 5·06 per cent.

"There was a large percentage of dirt, but antimony, arsenic, &c., were not present, or were in such inappreciable quantities as not to be recognised. Where the metals are fused by an ordinary fire the fumes travel no great distance. This method is now discontinued in Crieff and was only used on five occasions. It is different where the metals in quantities of 1 cwt. or less are melted by means of a small blast or reverberatory furnace. In this case the fumes travel much further and are emitted daily. In September, 1895, I certified the death of a young girl as inherited and acquired poisoning, lead and manganese. An analysis of the deposited fumes on the cottage where she lived 200 feet from the blast furnace gave: manganese, 0·102 per cent.; iron, 3·40 per cent. There was a large percentage of dirt, with traces of lead and arsenic. This analysis was made by a chemist whose business it was to examine iron rails for the presence of the required manganese and the absence of arsenic. The father of this girl also died of chronic metallic poisoning early in the same year. The girl when an infant suffered from colic."

Composition of Fumes.

As to the composition of the very hot fumes escaping from the chimney of the two trades, the natural inference would be that in the one they would be iron and coal smoke and in the other lead and coal smoke. But the blacksmith does not use pure iron, nor does the plumber use pure lead. The iron used by the blacksmith may contain carbon, manganese, silicon, sulphur, phosphorus, copper, and perhaps tungsten and chromium. And the plumber uses more than lead. He uses tin, copper, zinc, &c. These metals are no more pure than his lead. Lead occurs in nature as an oxide and as a sulphide, also in saline combinations forming the native sulphate, phosphate, carbonate, chromate, molybdate, and arsenate. Tin in its natural state is generally found associated with arsenical iron pyrites and a mineral called wolfram, which is tungstate of iron and manganese. Copper is found naturally associated with iron, arsenic, sulphur, tin, and tungsten. Zinc is found associated with iron, sulphur, and manganese.

I have no analytical evidence that the blacksmith's fumes contain chromium, tungsten, copper, and phosphorus, but they certainly contain iron, manganese, carbon, sulphur, and silicon. The intensely poisonous nature of ferro-silicon is well known. In the same way I have no analytical evidence that the plumber's fumes contain chromium, tungsten, molybdenum, or phosphorus, but they certainly contain lead, iron, manganese, copper, zinc, tin, and arsenic. In each trade there is in addition to the metallic fumes, the coal smoke. Coal, as we all know, is principally composed of carbon, and also contains hydrogen, oxygen, nitrogen, sulphur, &c. When coal is kindled the mass is gradually heated, producing various compounds of carbon, hydrogen, and sulphur. Some of the compounds, such as marsh gas and olefiant gas, burn without much smoke. But others, such as benzene and naphthalene, important constituents of tar, are only partially burnt and are deposited in the chimney as soot. But no soot is deposited in the chimneys of the industries in question: it is sent right out into the air.

With regard to the composition of the metallic fumes, I give an analysis of the deposits found 400 feet from a blacksmith's shop and of those found 120 feet from a plumber's shop. These analyses were kindly made by the late Mr. Ivison McAdam, F.R.S.E., F.I.C., F.C.S., Analytical Laboratory, Surgeons' Hall, Edinburgh, on June 27th, 1895, and are as follows:—

	(A) *Blacksmith.*		(B) *Plumber or Tinsmith.*
	(A)		(B)
Moisture	17·22	...	22·16
Organic vegetable matter	66·93	...	3·63
Mineral matter	15·85	...	74·21
	100·00		100·00
Mineral matter consists of—			
Insoluble silicon matter	77·52	...	90·29
Tin oxide ...	0	...	s.t.
Ferric oxide	18·01	...	6·16
Ferrous oxide	1·25	...	0·38
Copper oxide	0	...	0·21
Zinc oxide ...	0	...	0·04
Manganese oxide	s.t.	...	s.t.
Plumbic oxide (lead)	0	...	s.t.
Arsenic	0	...	s.t.
Carbonate of lime	1·84	...	2·54
Sodium chloride ...	1·23	...	0·24
Sodium sulphate	0·17	...	0·14
	100·00		100·00

s.t. = slight trace.

The deposit marked "Blacksmith" was of a bright green colour and when examined under the microscope was seen to consist of vegetable cells of a very simple character. When heated the residue was red in colour from the presence of iron oxide. The insoluble portion consisted of fragments of siliceous matter. The plumber or tinsmith's sample had a dark green colour and when burned the residue was red. The insoluble matter consisted of small stones and other siliceous particles."

The following are passages from reports issued by me in 1895:—

"*Blacksmith.*—I am of the opinion that the business of a blacksmith is an offensive process of trade, and so far as I have been able to observe it is carried on without any precaution. I am informed that in the forging of horseshoes, &c., about 25 per cent. of iron is lost probably in the shape of fumes driven into the air at a low level by the bellows or wind furnace. In the neighbourhood of forges the fumes are to be seen as a green deposit or pigmentation of buildings, fences, trees, &c. In estimating the nature of the fumes in addition to the iron, we have to take into account its impurities, such as arsenic, phosphorus, and the added manganese. Some new and dangerous compound seems also to be formed. Singular and fatal cases of sickness are to be met with among individuals long exposed to the fumes. [A number of cases were here recorded.] I should recommend that the chimney of every forge should be provided with a cap or hood."

"*Plumber.*—These diseases and symptoms were observed in the neighbourhood of a plumber's place of business, with notes on the effects of the fumes on animal and vegetable life. Vegetation wherever exposed to the fumes succumbed or was arrested in growth. Animals suffered from rheumatic, digestive, respiratory, circulatory, nervous, genito-urinary, and integumentary disturbances. The diseases observed in man were rheumatic, digestive, respiratory, circulatory, nervous, genito-urinary, and integumentary disturbances. Rheumatism, lumbago, sciatica, and persistent pains in the muscles and tendons were common; audible creaking in joint and of tendons was noticed."

Manganese Poisoning.

When I commenced the inquiry into metallic fumes in 1892 little seemed to be known about manganese. In an official document I characterised it as a poison possessing properties like arsenic and phosphorus. More recently some information was to be gained from books, especially from Dr. Phillips's "Inorganic Materia Medica." From that book it may be learned that Kobert found that manganese when given by the mouth is inert, but when injected subcutaneously it is an active agent. I think it is equally active when it is inhaled. According to Phillips, manganese slows the pulse and heart's action and produces convulsions; when long continued it produces progressive wasting and feebleness, or staggering gait and paraplegia, with vomiting and purging. Phillips thinks its action is like that of lead or zinc.

From the reports submitted it may be gathered that my opinion is that large quantities of metal are fumed from the forge of the blacksmith and the furnace of the tinsmith and the plumber. From both manganese seems to be emitted; it has a strong affinity for carbon, and the deposited fumes are principally seen on wooden fences and trees, and on the slates and stones of buildings. Both also emit iron, and so far there is a similarity. While the tinsmith or the

plumber's fumes contain lead and small quantities of zinc, tin, arsenic, copper, and perhaps antimony, the blacksmith's probably emits larger quantities of arsenic, and in addition phosphorus, sulphur, and silicon, and the products from the combustion of coal. The complaints observed in the houses of the neighbourhood of the trades are similar. There is, however, a difference. While cancer and erysipelas seem common in the vicinity of the blacksmith's they are not observed in the case of the other trade. On the other hand, cases of persistent pains in the bones and of onychia were observed in the vicinity of the tinsmith and plumber's furnace. The foregoing details were practically embodied in my annual report of 1895, which was printed and circulated at that time. In the "Nomenclature of Diseases, 1906," iron is scheduled as one of the poisonous metals as well as 12 others, including arsenic, copper, lead, and zinc, but neither tin nor manganese is mentioned. These are the seven metals found in the fumes by Mr. McAdam, one of the first analytical chemists of his day. Anilin, benzene, &c., are to be found scheduled under the poisonous organic substances.

As I have already said, little was known about manganese when I commenced my inquiry, and as little about coal-tar as a poison. Four or five years ago, however, there appeared a work on industrial poisoning, written by Dr. Rambousek, Professor of Factory Hygiene, Prague.

According to Rambousek, as early as 1837 nervous disorders had been described in workmen who ground manganese dioxide. He goes on to say that the malady was forgotten till 15 years ago, when von Jaksch, in Prague, demonstrated several such cases in persons employed in a large chemical factory in Bohemia for the drying of Weldon mud. Von Jaksch is of the opinion that only manganese dust rich in manganese protoxide is dangerous. According to Rambousek, the important constituents of tar are:—(1) Hydrocarbons of the methane series: paraffin, olefine. Hydrocarbons of the methane series: benzene and its homologues, naphthalene, anthracene, phenanthracene, &c. (2) Phenols, cresols, naphthols. (3) Sulphides, sulphuretted hydrogen, carbon bisulphide, mercaptan, thiopen.

Rambousek adds that in tar distillation industrial poisoning frequently occurs. Workmen coming into contact with tar suffer from an inflammatory affection of the skin—so-called tar eczema—which occasionally takes on a cancerous nature similar to chimney-sweeper's cancer. In lampblack workers, who tread down soot in receptacles, the malady has been observed to affect the lower extremities, and especially the toes. Anilin is a very frequent cause of poisoning, and it is apt to produce pneumonia. Rambousek gives the case of a workman employed for 11½ years in the anilin department who died of cancer of the bladder. He says that cancerous tumours are frequently observed in anilin workers and that anthracene workers suffer from a skin eruption on the hands, arms, feet, knees, &c., which sometimes develops into cancer. He considers benzene to be very poisonous, producing unconsciousness and sudden death, and industrial benzene poisoning to be especially frequent now in view of the increasing use to which it is put, and productive of pneumonia and severe inflammation of the respiratory passage.

Rambousek does not seem to have observed the digestive diseases observed by Phillips and myself, and neither of them note the rheumatic condition I recorded. Possibly the difference between Rambousek's observations and mine may be accounted for by the mental and physical character of the different nations. In Rambousek's cases, also, it is the workmen who suffer. In my case it is the general outside public.

THE ALTERATION OF THE ŒSTROUS RHYTHM IN GUINEA-PIGS BY UNDER-FEEDING.

UNDER well-regulated food conditions the œstrous cycle in the guinea-pig is almost uniformly 16–17 days in duration. G. N. Papanicolaou and C. R. Stockard, of the Rockefeller Institute, find that under-feeding with a diet of 20 g. of carrots per day produces a prolongation of the dicestrum, and at the same time a congestion of the ovary and uterus with degeneration of the Graafian follicles; the extent of the prolongation depends upon the stage at which the animal is underfed. Under-feeding during the first 5–7 days of the dicestrum has only a slight effect, the next œstrus being postponed for one or two days, while under-feeding during the latter part of the dicestrum—that is, 12–17 days after an ovulation and œstrus—leads to a delay of about 7 days, the ovum being expressed at the twenty-third to twenty-fifth day instead of at the seventeenth day. Should an animal be underfed for 7 days—from the tenth to the seventeenth day—after œstrus, the next ovulation and œstrus is postponed for 10–11 days, arriving at the twenty-seventh or twenty-eighth day instead of at the seventeenth day. These variations are associated with the fact that the conditions of the ovary vary at the different times. Shortly after an ovulation the ovary contains almost entirely small primary follicles, not so unfavourably affected by food conditions as are the large Graafian follicles, which begin their growth and development during later stages of the dicestrum. A large follicle at the height of its development seems to require much better nutrition than does a small primary follicle, and the lack of proper food arrests its progress very readily; thus late under-feeding has the more injurious effect, and the postponement of the next œstrus is correlated with a retarded development of new ripe follicles in the ovary. The entire œstrous activity depends on the conditions prevailing in the ovary. The delay of ovulation for 11 days following late and long under-feeding and after the under-feeding has been stopped is in accord with experiments which show that after removal of all young corpora lutea following an ovulation the next ovulation arrives in about 11 days instead of 16–17. This acceleration of 5–6 days is due to the absence of the corpora lutea, which, if present, evidently inhibit the maturation or prolong the time necessary for the development of ripe follicles in the ovary. These experiments all demonstrate the sensitiveness of the follicles in the ovary to environmental conditions. Extreme variations in the œstrous cycles have been observed in rats, and may in part be due to variations in diet.

COLONIAL HEALTH REPORTS.

St. Helena.—Major H. E. S. Cordeaux, C.B., C.M.G., Governor and Commander-in-Chief, in his report for 1919, states that the estimated civil population on Dec. 31st was 3468. The death-rate was 7·94 per 1000, and the birth-rate 33·98, being the lowest and highest respectively since 1909. The general health of the colony during the year was remarkably good, taking into consideration the state of semi-starvation in which a large portion of the poorer classes live. The want of a qualified dentist becomes more pressing every year. The colonial surgeon reports: "The state of the teeth and degree of oral sepsis found amongst the people of St. Helena, through years of neglect, is truly appalling, and is, no doubt, responsible for the large proportion of septic cases dealt with at the Civil Hospital. A great part of the colonial surgeon's time in the out-patient department of the hospital is taken up with extracting teeth, which in most cases could have been saved by the timely aid of a dentist." Hitherto, all efforts to induce a qualified dentist to visit the island have proved unsuccessful, mainly on the score of expense. There were 213 admissions to the hospital during the year, and there were 6 deaths. Miss Hart, the lady superintendent, resigned towards the end of the year, owing to failing health, after 14 years' devoted service in a position of exceptional difficulty and responsibility, and was succeeded by Miss Bennett. Referring to the scarcity of foodstuffs and the high cost of living, the Governor remarks: "The shortage of rice, though regarded as little short of a calamity by the poorer classes, may eventually prove a blessing in disguise by demonstrating that what has from long habit come to be regarded as an indispensable article of diet can be replaced by cheaper and more wholesome substitutes grown at their own doors. It is hoped that the efforts now being made to encourage increased production of foodstuffs and fodder will bear good fruit next year."

Gilbert and Ellice Islands.—In his report on these islands for 1918–19 Mr. E. C. Eliot, the Resident Commissioner, writes:—

"To date we have been spared the ravages of influenza, which took such a heavy native toll in the more southerly Pacific groups. Vaccination was carried out throughout the islands, the natives willingly subjecting themselves to the precaution. An acknowledgment of the willing coöperation, at some financial sacrifice, of shipping firms trading between Australia and these islands, also between Samoa and the Ellice Group, is here recorded, but chiefly are we indebted to Dr. Gould, of Ocean Island, who, by his forethought and untiring efforts as medical officer of health, staved off the danger which closely threatened the island on several occasions. For the time Ocean Island was the only port of entry for the colony, as Tarawa in the Gilbert Group and Funafuti in the Ellice, were closed as ports of entry owing to the lack of medical officers.

"Owing to the lack of communication following the wreck of Messrs. Burns' Philp's Island vessel on the Abemama reef in September, 1919, it has been found impossible to obtain the usual vital statistics from the Ellice Group and from a number of islands in the Gilberts. From the returns received (from eight islands only) a slight increase of births over deaths is shown. The question of infant mortality is receiving closer consideration. Many infants die from lack of natural or suitable feeding, and tinned or preserved milks are both costly and difficult to obtain. If traders would encourage the sale of milk in preference to that of useless scents and other unnecessary and undesirable European luxuries, it would be the means of saving many young lives. The colony lost the services of the European medical officer during the year, but the Tarawa Central Hospital is still full of patients owing to the confidence inspired by native medical practitioner Sowani."

St. Vincent.—According to the Blue-book for 1918–19, the estimated population of the colony is 51,990. The birth-rate for the year was 34·52 per 1000 and the death-rate 21·47. Illegitimate births formed 66·46 per cent. of the total of all births. The daily average number of patients in the Colonial Hospital in 1918–19 was 86, the death-rate being 5·7 per cent. of the 1049 cases treated. The number of operations performed was 352. The Casualty Hospital at Georgetown, with four beds, continued to fulfil its purpose of providing the means of treating emergency cases, 32 cases being dealt with. At the Yaws Hospital 80 cases were treated, and 49 of these were discharged cured. At the usual district dispensaries and at special travelling dispensaries 999 other yaws patients were treated. From April 1st, 1916, to March, 1919, the total

number of cases of yaws treated in the colony was 2688; 1451 have been discharged cured. In the Leper Asylum there were 8 patients on March 31st, 1918; 4 were admitted in the year following and 2 died. The campaign undertaken by the Rockefeller International Health Board for the eradication of the ankylostomiasis, or hookworm disease, was carried on by Dr. P. B. Gardner to Sept. 9th, 1918. Of 21,430 persons examined 12,395 were found to be infected with hookworm; the number treated was 11,577, of whom 10,279 were cured. The sanitary preventive work of providing fly-proof latrines and closets of an approved pattern has proceeded uninterruptedly notwithstanding the closing down of the Rockefeller Health Board's campaign.

THE FLY IN COURT.

AN important decision of the Supreme Judicial Court of Maine is recorded in a recent issue of the U.S.A. Public Health Reports. The court decided in the case of Williams *v.* Sweet, 110 Atl., 316, that a guest who had contracted for a two weeks' stay at an hotel was justified in leaving before the expiration of this period when the dining-room was infested with flies. A contract admittedly was entered into for a fortnight's stay at the hotel, but after three or four days the guests left, paying the usual transient rate for the time they had been at the hotel, the reason assigned for leaving being that the flies in the dining-room were dangerous to health. No complaint was made regarding other conditions at the hotel. The proprietor sought to recover for the full two weeks' stay contracted for, and he succeeded in the lower court. But the supreme court granted the motion of the defendant for a new trial, holding that the guests were justified in leaving the hotel on the ground alleged. During the hearing of the action the dangers of the fly were discussed at great length in court, with free quotation from public health literature on the subject.

"HUMANE-KILLERS" IN SLAUGHTER-HOUSES.

AT the last meeting of the Taunton Rural District Council the medical officer of health urged that measures should be taken to prevent the cruelty to animals caused by the work of slaughter-houses being done by inexperienced persons, and through the neglect to use "humane-killers." A retired butcher, a member of the council, supported the medical officer, and said that the use of "humane-killers" should be made compulsory. On the recommendation of the medical officer of health an inspector of the Society for the Prevention of Cruelty to Animals was appointed honorary assistant sanitary inspector, with a right of entry to the rural slaughter-houses.

MALNUTRITION IN NEW YORK.

AN investigation into malnutrition is at the moment being conducted in New York by a body called the "New York Association for Improving the Condition of the Poor." An area of 40,000 inhabitants in the Italian quarter of the city has been selected for an intensive investigation into the causes of disease with a view to its prevention. In addition to dealing with pre-natal and post-natal conditions a thorough medical examination is made of every child. Actual physical defects are dealt with and the children kept under continuous observation for 12 months. This is done either at what are called nutrition clinics or at the home. The precise function of these clinics does not emerge very clearly from the report before us, whether they are purely medical clinics for examination and treatment of selected cases of malnutrition, or whether they are at the same time educational health centres for the whole area. It is found that the most satisfactory work is done in the home, where the child is weighed weekly in the presence of the mother. His diet and daily routine are carefully regulated, and if at the end of four months he makes sufficient improvement he is then visited monthly for the following eight months. The diagrams illustrating the growth and development of children under observation are of little value on account of the small numbers involved. The experiment is being carefully and accurately carried out, and should show interesting findings as to the relation of dietary, regulated exercise, and rest on child growth, but it is possible that the eventual findings may not justify the expensive and elaborate methods employed.

THE NEEDS OF BRUMMANA HOSPITAL.

THE British Hospital on the western slope of Mount Lebanon, under the care of the Friends' Foreign Mission Association at Brummana, has done excellent work for 40 years, but is now in urgent need of medical and surgical materials of all kinds. The Turks occupied the buildings during the war, and on their retirement in 1918 stripped the hospital, leaving it in a filthy condition. Dr. A. J. Manasseh, the medical superintendent, has been able to shelter Syrian and Armenian children there during the past two years, the Red Cross and the Syria and Palestine Relief Fund having furnished necessaries enabling 50 patients to be taken; half this number, however, were obliged to sleep on the floor on account of the shortage of beds and bedding. Dr. Manasseh is now in this country, and expects to return at the end of this month to Brummana, where he hopes to re-establish medical work in a district which the war has left in a very degraded condition. The need of such assistance for Syria can hardly be overstated; malaria, typhus, dysentery, relapsing fever, scurvy, and scabies were rife throughout the war. After the Turkish retirement typhus and relapsing fever were stamped out by means of a campaign against lice, but lack of materials prevented headway being made against the other diseases. Dr. Manasseh was able at one time to clear the hospital compound of mosquitoes by the use of paraffin oil, which was also poured when possible on the surface of all rain-water cisterns, tanks, and ponds in the neighbourhood, but the supply gave out, and malaria continues to be prevalent. Nothing has apparently yet been done by the new French Government to improve the condition of the mass of the people. Any form of medical stores or hospital equipment will be gratefully received by Dr. Manasseh, c/o F.F.M.A., 15, Devonshire-street, London, E.C. 2.

THE current issue of "It," the organ of the Federation of Norfolk Teachers, contains an article on the School Medical Services, in which complaint is made of the dogmatic ways of medical officials and their lack of coöperation with the general practitioner, as well as their want of deference to him. It would certainly add to the efficiency of the service if the general practitioner were more often coöpted as a worker in treatment and routine inspections, and we are glad to observe among administrative departments an awakening to a sense of the value of the general practitioner in any scheme for the development of public health.

Communications, Letters, &c., to the Editor have been received from—

A.—Mr. S. E. Atkins, Exeter; Sir R. Armstrong-Jones, Lond.; Messrs. Allen and Hanburys, Lond.

B.—Dr. W. Brown, Lond.; Barnold's International News Service, Lond.; Board of Education, Lond.; Messrs. P. Blakiston's Son and Co., Philadelphia; Brig.-Gen. W. W. O. Beveridge; Dr. A. D. Bigland, Liverpool.

C.—Child Study Society, Lond.; Charing Cross Hospital Medical School, Lond., Governors and Staff of; Companhia de Moçambique, Lond.; Dr. C. Coombs, Bristol; Chadwick Trust, Lond., Sec. of; Cunard Steamship Co., Liverpool.

D.—Sir D. Duckworth, Lond.; Dr. T. M. Draper, Lond.; Mr. A. Doran, Lond.; Dr. V. Dickinson, Lond.

E.—Mr. W. Edgeley, Lond.; Mr. A. Elliot, Edinburgh; Edinburgh Dental Hospital School.

F.—Mr. R. Farrant, Lond.; Dr. A. Florence, Geneva; Faraday Society, Lond., Sec. of; Mr. W. R. Farebrother, Lond.; Dr. R. M. Frazer, Belfast; Dr. H. W. Frauenthal, New York.

G.—Dr. W. Griffith, Lond.; Dr. A. M. Gossage, Lond.; Great Northern Central Hospital, Lond.; Dr. J. Gairdner, Crieff; Dr. H. Gluckman, Johannesburg.

H.—Mr. H. E. Haynes, Brentwood; Dr. P. Hamill, Lond.; Dr. R. Howden, Newcastle-on-Tyne; Mr. J. T. Henderson, Pietermaritzburg; Hospital for Sick Children, Lond.; Hull, Medical Officer of Health of; Major W. E. Home, R.A.M.C.; Dr. A. Hay, Aberdeen; Dr. J. R. Harper, Barnstaple; Hunterian Society, Lond.

I.—Insurance Committee for the County of London.

J.—Mr. G. Jefferson, Manchester.

K.—Dr. W. N. W. Kennedy, Croydon; King's College Hospital Medical School, Lond., Sec. of.

L.—London Medical Exhibition, Manager of; Dr. R. B. Low, Lond.; London Hospital Medical College, Sec. of; Dr. L. Ley, Great Yarmouth.

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O.—Col. M. D. O'Connell, Leeds; Dr. E. R. Ormerod, Nottingham; Oxford Medical Publications, Lond., Manager of.

P.—Sir John Phillips, Lond.; Professional and Business Women's Hospital League, Lond.; Post-Graduate College, West London Hospital.

R.—Royal Society of Tropical Medicine and Hygiene, Lond.; Dr. J. D. Rolleston, Lond.; Dr. R. R. Rentoul, Liverpool; Royal Society of Medicine, Lond.; Mr. W. Robertson.

S.—Prof. C. E. Spearman, Lond.; St. Mary's Hospital Medical School, Lond.; Prof. W. Stirling, Manchester; Sheringham Daylight, Lond.; Lt.-Col. J. W. Springthorpe, A.A.M.C., Melbourne; Mr. C. H. Stevens, Wimbledon; Seamen's Hospital, Lond., Sec. of; St. Thomas's Hospital Medical School, Sec. of; Dr. C. Singer, Oxford; Scientific and Industrial Research Dept., Lond., Sec. of; St. Marylebone General Dispensary, Lond., Sec. of; Mr. W. M. Scott, Bridgwater; South Australia, Registrar-General of, Adelaide; Dr. D. A. Stewart, Ninette, Manitoba; Dr. G. A. Stephens, Swansea; Dr. F. Shufflebotham, Lond.; Dr. G. H. Simmons, Chicago.

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V.—Prof. S. Vincent, Lond.

W.—Dr. F. P. Weber, Lond.; Dr. J. C. Watt, Lond.; Dr. H. de C. Woodcock, Leeds; Dr. W. H. Wilson, Lond.; Dr. G. Ward, Sevenoaks; Dr. R. L. M. Wallis, Lond.; Dr. F. C. Willmot, Cape Town; Messrs. Witherby and Co., Lond.

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